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A MANUAL OF AUDIO-VISUAL TECHNIQUES

second edition

R. E. deKieffer & Lee W. Cochran

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STATE INSTITUTE OF EDUCATION ★ Govt. of West Bengal

MANUAL OF

AUDIO-VISUAL TECHNIQUES

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SECOND EDITION

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MANUAL OF AUDIO-VISUAL TECHNIQUES, 2nd Ed.
by R. E. DeKieffer and Lee W. Cochran

PRENTICE-HALL INTERNATIONAL, INC., Englewood Cliffs
PRENTICE-HALL OF INDIA PRIVATE LIMITED., New Delhi
PRENTICE-HALL INTERNATIONAL, INC., London
PRENTICE-HALL OF CANADA LTD., Toronto
PRENTICE-HALL OF JAPAN, INC., Tokyo

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Reprinted in India by special arrangement with Prentice-Hall, Inc., Englewood Cliffs, N. J., U.S.A.

This book has been published with the assistance of the Joint Indian-American Standard Works Programme.

Printed by G. D. Makhija at the India Offset Press, Delhi and published by Prentice-Hall of India Private Limited., New Delhi.

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PREFACE

The age of automation and technology has presented to education a vast array of instructional material and equipment. These materials and equipment are actually tools of the educational profession. With them we can materially improve instructional methods and techniques.

This manual describes many ways by which teaching may be enhanced and enriched with the effective utilization of this vast range of teaching tools. Further, it gives the reader an opportunity to develop and study techniques and materials that may be used in teaching his own subject regardless of content or grade level.

Manual of Audio-Visual Techniques provides concise textual information concerning a great many media of communication and the correct techniques for handling them to their best advantage. The authors have gathered material from outstanding textbooks and research studies and have interpreted it from the standpoint of practical teaching experience. The manual contains references at the end of each chapter to the following leading textbooks in the audio-visual field so that students may read, at greater length, material related to the specific subject of the chapter:

Brown, James W., Richard Lewis, and Fred Harcleroad. *Audio-Visual Instruction Materials and Methods.* New York: McGraw-Hill Book Co., Inc., 1959.

Dale, Edgar. *Audio-Visual Methods in Teaching,* rev. ed. New York: Dryden Press, Inc., 1954.

Haas, Kenneth B., and Harry Q. Packer. *Preparation and Use of Audio-Visual Aids,* 3rd ed. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1955.

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Weaver, G. G., and E. W. Bollinger. *Visual Aids, Their Construction and Use.* New York: D. Van Nostrand Co., Inc., 1949.

Wittich, Walter Arno, and Charles Francis Schuller. *Audio-Visual Materials, Their Nature and Use,* 2nd ed. New York: Harper & Bros., 1957.

Additional bibliographic material includes those current articles, books, pamphlets, and filmstrips that best illustrate the particular subject under discussion. A series of thought-provoking problems and projects in each chapter enables students to acquire immediate, practical experience in the new techniques. All pages are perforated and punched, and may thus be kept in a notebook for later reference.

This manual is suitable for workshops, short courses, seminars, or quarter and semester courses. Separate chapters may be selected for intensive study in the first three categories, and the entire manual may be used as a framework for a quarter or semester course with either preservice or inservice teachers.

The following procedure is suggested for best results: Read the chapter thoroughly; read the bibliographic references for a comprehensive study of the subject; preview the films and filmstrips not used in class; and then apply the information gained of the subject to each problem or project. The student should do all of these things with particular reference to his own subject matter area. The problems and projects listed in each chapter may be assigned as a group, or specific ones may be selected in terms of the interests and needs of the students. The answers to some of the problems are not rigid, because they depend upon student background and interest.

For best results, the authors recommend that the students have ready access to the textbooks listed in the bibliographies. It is further suggested that students be given an opportunity to study, handle, and operate real audio-visual equipment and materials. A well-supplied audio-visual laboratory containing projected, nonprojected, and audio materials is of great value in having students "learn by doing." All of the films and filmstrips listed in the bibliographies may be procured from the producers if they are not already on hand. As many films and filmstrips as possible should be used during the course; those not actually used may be previewed. At the end of the training period, it is advisable to return the manuals to the students so that they may be used as a review and source of ideas at a later date.

Robert E. de Kieffer
Lee W. Cochran

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MANUAL OF

AUDIO-VISUAL TECHNIQUES

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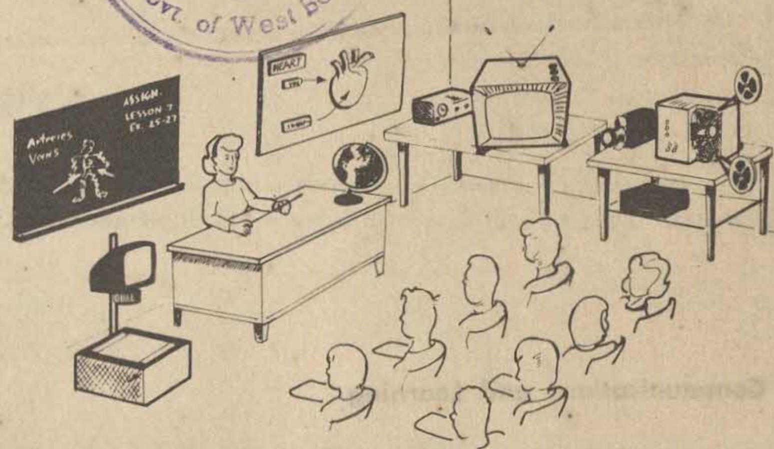
UNIT ONE

TOWARD MORE EFFECTIVE COMMUNICATION



1

THE COMMUNICATIONS PROBLEM

THE KEYSTONE of education is communications; a give-and-take of ideas which blend into a mutual understanding of a theory, principle or fact. If education is to fulfill its primary mission, that of transmitting the cultural heritage from generation to generation, and assisting youth in growing into their adult role, more emphasis must be placed upon an understanding of the communications process and more attention devoted to the improvement of effective communications techniques.

Primitive Communications

It is popularly believed that communications is something new which was introduced with the discovery of electricity. Such is not the case, for during the period when primitive man roamed sections of the earth, many forms of communications were developed and used.

"He grunted his way to phonetic speech, figured and daubed his way to art, used his muscles to develop the many forms of dance, and learned to give meaning by the pitch of his voice, and by the way he used the muscles of his face. He gathered pieces of stick and lay them in his track, blazed trees to tell others of the path, used the smoke of his campfires to carry his messages, used his hands to talk with strangers, developed rituals to tell the story of the tribe . . ." [1]

---

[1] Floyde E. Brooker, "Communication in the Modern World," *Audio-Visual Materials of Instruction, Forty-eighth Yearbook* of the National Society for the Study of Education, Part I (Chicago: The University of Chicago Press, 1949), p. 7.

Primitive man also learned to use fire, fashion and use tools, domesticate animals, build shelters, weave cloth, cultivate plants for food, and live together for mutual help and protection. The continuation of their society, and, in fact, their very existence, depended largely on communication.

1. List the types of communications you personally use today which were also used in the days of the cave man.

Communications and Learning

Communications is a complex system which involves sharing or participating between two or more people. *Learning,* however, is a personal thing. If we are to understand ways by which we can more effectively communicate with others, it is vital that we understand how people learn and apply this knowledge to the communications process.

What Are the Basic Ingredients in Learning?

Psychologists tell us that there are many *conditions* which affect the amount and kind of learning which an individual may acquire. These are the *what, why* and *how* of the learning situation.

The Why of Learning

When we are enthusiastic and eager to learn something new, for example, the operation of a 16 millimeter projector or a recorder, we are ready for learning. We may be further motivated if we realize that if we do not learn the operation of this equipment, we may not be able to use it in our classroom.

The first conditioning factor in learning is the quality of the motive, itself, to learn.

The What of Learning

Learning becomes difficult, discouraging, and inefficient when there is no *direction* to the instruction. Each phase of instruction must have clearly-stated goals or objectives and the presentation should follow a logical sequence.

The second factor in learning is a demand that instruction be clear, concise, and understandable, and directed toward specific goals.

The How of Learning

Under most conditions, the best learning takes place when the greatest number of senses are stimulated. Although we probably could learn the fundamentals of equipment operation from books, learning is increased and retained longer if we are given a piece of equipment with which to practice.

The third factor in learning is the method by which we learn, and the degree of similarity between new experiences and previous knowledge.

How Do People Actually Learn?

Simply stated, there are three basic steps in the learning process. These are: (1) Experience, (2) Understanding, and (3) Thinking. Let us examine these steps and determine the role audio-visual materials play in this process.

Experiences

In every normal human there are a number of sense receptors. These are the antennae of the brain and are the means by which we receive stimuli and respond to experiences. Without such receptors, we would be unable to perceive or experience anything and, thereby, unable to learn.

2. It has been said that "in any learning situation the more senses which are stimulated, the more a person learns and the more he retains." How do you explain this statement?

Experiences that are perceived may be of several different varieties. Some are direct, firsthand or concrete sensory experiences, some are vicarious or representative experiences, while others are abstract or symbolic experiences.

3. List the types of audio-visual materials that fit into these three categories.

Direct, Concrete Sensory Experience	Representative Experience	Symbolic Experience

Understandings

The next step in the learning process entails the blending of experiences into meaningful conceptual groups. The blending of such experiences occurs in the mind, for an experience perceived and retained is mental process. This process is called understanding.

"To comprehend means to understand—comprehension is an organizing, synthesizing process that integrates experiences into larger, meaningful units." [2]

Through lecture, demonstration, explanation, and assigned readings, we anticipate that our students will acquire experiences to comprehend and understand the subject matter we are teaching. Unfortunately this is not always true, because in some cases the experiences we provide are not meaningful. Often we assume that our students come to us with a richer background of experiences than they actually possess.

It is a major task of all teachers to analyze their teaching methods, procedures and materials and to develop coherent units of knowledge called topics. "Topics are developed by the enrichment of experiences, by differentiation of details, and by the synthesis of details into a structural unity." [3]

4. What are possible explanations for your *not* understanding something a person tells you?

5. List several ways by which you could improve the understandings of students in the classroom.

Thinking

Thinking is the next step in the mental process. "The efficient thinker is able to organize his experiences as usable associations, incorporating new experiences as they are learned. To discover relationships between two situations or even two experiences is an important aspect of the integrating process." [4]

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[2] Kingsley, Howard L., *The Nature and Conditions of Learning* (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1946), p. 332.

[3] Ibid., p. 333.

[4] Crow, Lester, and Crow, Alice, *Educational Psychology* (New York: American Book Company, 1948), p. 238.

6. What does a teacher want children to do when she asks them, "Think for a moment about what you believe the Eskimo children eat." (Explain)

The experiences we have—whether they are concrete, representative, or abstract—develop understandings that are influenced by our feeling or attitude. "Attitudes can exert a potent influence upon an individual. They act as causes as well as results of behavior. They are personal and are associated with the feeling tones connected with the individual experiences. They represent the way he feels, as he thinks, talks, or acts in any situation." [5] For example, many of us have formed an attitude about rats. This attitude may have been formed as a result of an unfortunate personal experience, reading about the danger of rat bites, or by the attitude of parents or friends. Our own attitude, backed by emotions, may make us run when we see one, kill it, or let it pass by. Our attitude affects the way we approach any learning situation. If we have a receptive attitude, we are more likely to benefit from the learning experience.

San Diego City Schools

A CONCRETE LEARNING EXPERIENCE.

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[5] Ibid., p. 241.

7. What is your attitude about the use of audio-visual materials?

How was this attitude formed?

Audio-Visual Materials in Learning

As we have seen, the basis for all learning is experience. Usually learning is best effected by concrete, direct, firsthand experience. Teachers are often unable to give students firsthand experiences and resort to an economical method of communication, the use of words, both written and spoken. However, most teachers realize that the use of words *alone* cannot and will not provide vivid learning experiences. They are constantly on the alert for methods and materials which will make lessons meaningful. With the wise selection and use of a variety of audio-visual materials, experiences can be provided which will develop understanding and enhance thinking.

8. Give a definition for the word "verbalism."

The Teacher and Communications

It has been said that "education is a process of growth and development which begins with infancy and continues until senescence or death." Education, then, may be thought of as a process, not an event. Throughout life we are both students and teachers, both on a formal and an informal basis. As students and teachers, our primary job is to communicate effectively. We are always helping someone learn something. We are also always learning something new.

9. List several examples of things you have learned recently and the media which were used in presenting the material.

Learning Experience	Media Used

Some people like to teach, and spend years studying specialized areas of knowledge to prepare themselves for classroom teaching. Many others, while they never see the inside of a classroom, enjoy helping others to learn. All of us, whether we are trained teachers or not, are constantly teaching or learning something. A father teaches his boy to fish; a mother teaches her daughter to cook. A business man trains his assistant and a salesman teaches his customer to use a new home appliance. Whether a person is a good or bad teacher depends, to a great extent, on his ability and desire to communicate effectively. A knowledge of subject matter alone is not enough. A master teacher must also know how to transmit this information to others and be sure that it is understood.

10. Each of us can remember one person he felt was a master teacher. Identify the person you would consider a master teacher and list several reasons for your choice.

Name of Master Teacher ____

Reasons

a.

b.

c.

d.

e.

f.

Teaching and dynamic communications are synonymous, for good teachers are clear communicators, good communicators are effective teachers. They know the value of thorough understanding and use every means they can to communicate ideas to others.

Our society today has a vast array of modern media of communication. Never before have teachers possessed materials that so completely allow their students to relive the past, visit distant lands, hear voices of the world's great men and women, view planets or the private life of an amoeba, all within the walls of a single classroom. These modern media are among the tools the education profession uses to mold and shape human minds.

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AUDIO-VISUAL MATERIALS *

Films:

"Ancient World Inheritance," 10 min., sd., b&w, or color, Coronet, 1949.
"Bridge for Ideas," 28 min., sd., b&w, University of Southern California, 1951.
"Communications Primer," 22 min., sd., color, Museum of Modern Art, 1956.
"Making Yourself Understood," 14 min., sd., b&w, Encyclopaedia Britannica Films, 1954.
"Milestones in Writing," A Series. Department of Cinema, University of Southern California.
"The Story of Communications," 22 min., sd., b&w, Films, Inc., 1947.

Filmstrips:

"Communications in Modern Life," 35 frames, si., b&w, McGraw-Hill, 1956.

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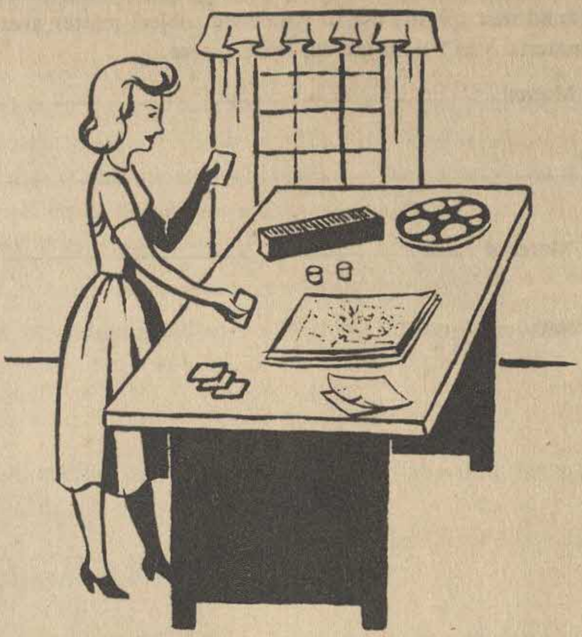
* sd=sound; si=silent; b&w=black and white. These abbreviations will be used throughout.



2

PLANNING FOR THE USE OF AUDIO-VISUAL MATERIALS

AUDIO-VISUAL MATERIALS are *not* a *substitute* for good teaching. They are complementary materials which assist the teacher in the communications process. While there is no *one* way to use these materials, there are guide lines which should be considered, if you are to get the greatest amount of good teaching and learning from them.

When Are Audio-Visual Materials Used?

There is no specific time in the teaching-learning situation when instructional materials should be used. Much will depend upon the teacher, the subject matter, the students and the learning situation. There are, however, many uses for materials in making meanings clear. For example, they can be used for:

A. Introduction of a unit
B. Development of a unit
C. Interpretation of a unit
D. Follow-up or summarization of a unit
E. Correlations of bits of information
F. Identification of self with a situation
G. Transfer to real life situations
H. Motivation and arousing of interest
I. Individual and group therapy

1. Select one suggested use from the preceding list. Describe briefly how you would develop a learning experience around that specific use in your own subject matter area or grade level; also indicate the type of audio-visual material you would use for the purpose.

a. Subject Matter ____________________

b. Use ____________________

c. Type of Material ____________________

d. Description:

In answer to the question we asked a moment ago, "When are audio-visual materials used?" we conclude that: audio-visual materials should be used whenever they will facilitate the understanding of the written or spoken word.

SELECTING INSTRUCTIONAL MATERIALS.

Los Angeles City Schools

What Type of Material Should Be Used?

Teachers often ask whether they should use a motion picture, a series of slides, or flat pictures in a given situation. There is no *one* answer to the question for much will depend on the specific situation. If motion is important to learning, a motion picture is probably the best media. If individual student study is involved, the flat pictures may better produce the desired results. The selection of the media to be used is determined by the nature of the problem of communications involved.

The following is a helpful guide line to effective utilization:

A. Problem
What is the nature of my problem of communications? What am I actually trying to get across?

B. Media
Which media will best do the job?

C. Procurement or Production
Is the medium available from commercial or educational sources, or will I have to either produce it myself or have the students make it for, or with, me?

D. Use
How can I make the most productive use of the medium in my class?

E. Evaluation (After Use)
Was the medium the best one to have selected for the specific situation? Would I use the same medium again? Did I use the medium in the most effective way possible?

Teachers who follow these guide lines in selecting and using audio-visual materials will find that they will have little difficulty in knowing what type of material to use in any teaching situation.

2. Using the guide lines above, give an example of a communications problem in your own subject matter area or grade level and describe how you would approach its solution.

Subject Matter Area or Grade Level:

Problem:

Media:

Procurement or Production:

Use:

Evaluation:

How Are Audio-Visual Materials Used?

There are many ways to use teaching materials. The wise teacher recognizes that variety of presentation adds much to her teaching. While there is no pat formula for giving vitality to a presentation, there are suggested procedures that can be employed to improve the teaching-learning situation.

The following is a basic plan of good teaching:

A. Prepare yourself:
  (1) Consider the value and purpose of the material being covered.
  (2) Consider the needs and interests of the students.
  (3) Determine the nature of the problem of communication.
  (4) Select the medium that best meets the educational problem.
  (5) Consider how the medium can best be utilized.
  (6) Preview or audit the material to be used.

B. Prepare the classroom:
  (1) See that all the necessary materials are on hand and arranged for the best use.
  (2) Be sure that the light can be controlled if needed.
  (3) Check ventilation and seating.

C. Prepare the class:
  (1) Explain why the particular medium is being used.
  (2) Discuss what the medium includes.
  (3) Explain what you expect them to get out of it.
  (4) Introduce new words or terminology.
  (5) Describe any follow-up activities including tests.

PROPER INTRODUCTION OF THE FILM WILL PROVIDE MORE LEARNING.

San Diego City Schools

D. Present the materials:
  (1) Make the presentation forceful.
  (2) Watch the time.
  (3) Observe student reactions.
E. Summarize:
  (1) Discuss the presentation in detail.
  (2) Ask summary questions.
  (3) Clarify misconceptions.
  (4) Test, if necessary.
F. Follow-up:
  (1) Allow students to utilize their new knowledge.
  (2) Develop or assign follow-up activities.

Good teaching is an art, but as with all great artists, skills must be developed through practice, drill, and hard work. Basic to all good teaching is thorough advanced planning, and although some educators frown upon rigid, inflexible lesson plans, an organized, systematic outline of proposed classroom activities will be of great help to the teacher in making the most effective use of instructional materials.

3. Select a particular class session in your subject matter field or grade level and develop a lesson plan which includes audio-visual materials.

Grade Level ____________________ Subject Matter Area ____________________
Unit ____________________ Teacher ____________________

Title:

Objectives:

Materials Needed:

Content:

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AUDIO-VISUAL MATERIALS

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"Introduction to Student Teaching," 20 min., sd., b&w, Indiana University, 1950.
"New Tools for Learning," 19 min., sd., b&w, Encyclopaedia Britannica Films, 1952.

Filmstrips:

"Bringing the Community to the Classroom," 45 frames, silent, b&w, Wayne University, 1953.
"Effective Use of Audio-Visual Materials," 45 frames, si., color, Basic Skills Films, 1957.
"Making Teaching Effective," 38 frames sk., b&w, Ohio State University, 1952.

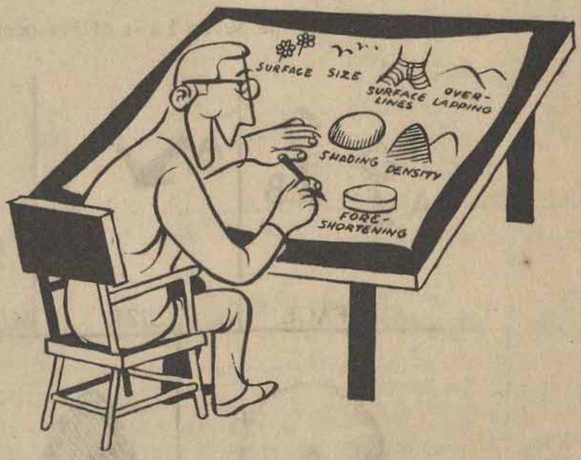
Recordings:

"The Improvement of Teaching Through Audio-Visual Materials," 33⅓ RPM (LP), Educational Recording Services.

"Improving Teaching Through Audio-Visual Materials," 20 min., 33⅓ RPM (LP), 12″, Educational Recording Service, 1952.

UNIT TWO

NONPROJECTED TEACHING MATERIALS



3

DRAWING

THE HISTORY of drawing for self-expression is older than the written history of mankind. Primitive man wrote in picture form to help illustrate important phases of his life. Yet, in many instances, the techniques of simple drawing have been neglected in the current training of teachers. Persons may be able to express themselves with words in a masterful way but be unable to make simple chalkboard drawings that are recognizable to students in the classroom. Teachers need not be artists to master the skills necessary to express themselves visually. Simple drawing techniques that will put meaning into teacher-made drawings can be learned by anyone.

Since teachers are constantly required to express themselves both orally and in visual terms, it is important for them to be able to master the simple rules of drawing. Learning to express oneself through simple drawing requires a knowledge of certain rules and conscientious practice.

Bruce McIntyre states:

> Too many people, whether they know how to draw or not, believe that a course in drawing is a course in art—that a person studying drawing is a person studying art. This concept tends to prevent many people who do not want to become artists (and many do not) from learning how to draw. More important to society than the teaching of drawing as a subject of art, is the teaching of drawing as a means of communicating visual knowledge.[1]

---

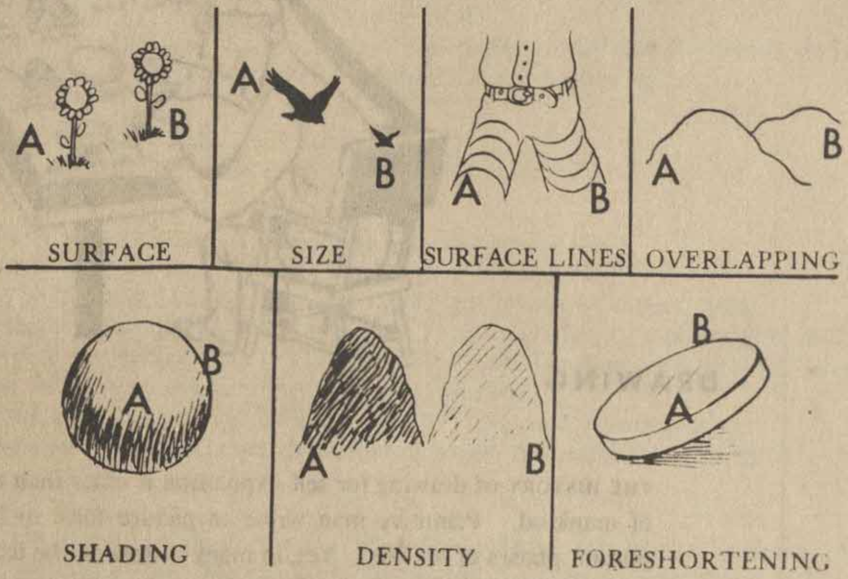
[1] Bruce McIntyre, *Tomorrow's Drawing Book* (Carlsbad, California: Audio-Visual Drawing Program, 1956).

Mr. McIntyre has spent a number of years developing an audio-visual drawing program to help teachers and students express themselves through drawing. He has shown, by offering a thirty-hour course in drawing, that most people can make very satisfactory drawings.

He further says:

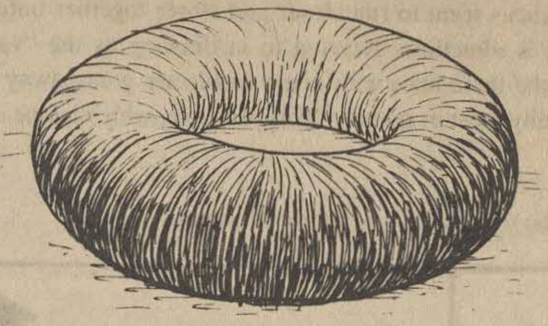
> The difference between the person who knows how to draw and the person who does not is that the person who knows, is able to draw into the flat surface of the paper, giving a feeling of depth or three dimensions, while the person who cannot draw tends to draw "flat" with little feeling of three dimensions, or depth. The basis of the drawing program is "The Seven Laws of Perspective"—Surface, Size, Surface Lines, Overlapping, Shading, Density, and Foreshortening.

1–7. After practice, draw the Seven Laws of Perspective.



THE SEVEN LAWS OF PERSPECTIVE

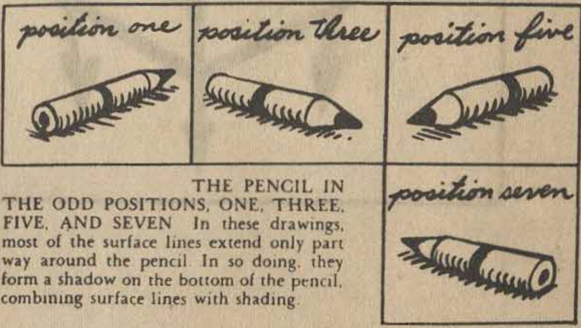
8. Combine all seven laws by drawing this doughnut by Bruce McIntyre.



Position

Most people, asked to draw an object, make the object appear in a flat position. To give the drawing more depth, and to show unique features, it is desirable to draw the object in different positions.

9. Draw a pencil in positions 1, 3, 5, 7 (see illustration).

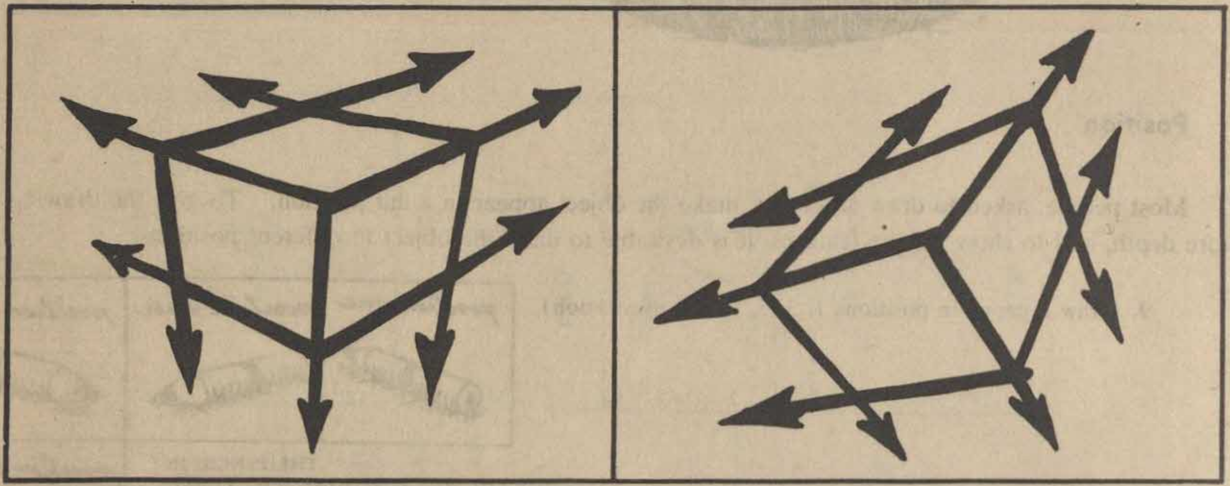


THE PENCIL IN THE ODD POSITIONS, ONE, THREE, FIVE, AND SEVEN In these drawings, most of the surface lines extend only part way around the pencil. In so doing, they form a shadow on the bottom of the pencil, combining surface lines with shading.

Alignment

If you look down a railway roadbed the tracks seem to run closer and closer together until they appear to meet in the distance. This optical illusion is sometimes referred to in drawing as the "vanishing-point system." In the drawing of the cube below, the three lines with arrow heads are going away from us. If these lines were to continue, they would eventually meet in space. This principle, which is one of the hardest to master, is known as alignment.

10. Draw the objects below and extend the lines to indicate proper alignment.



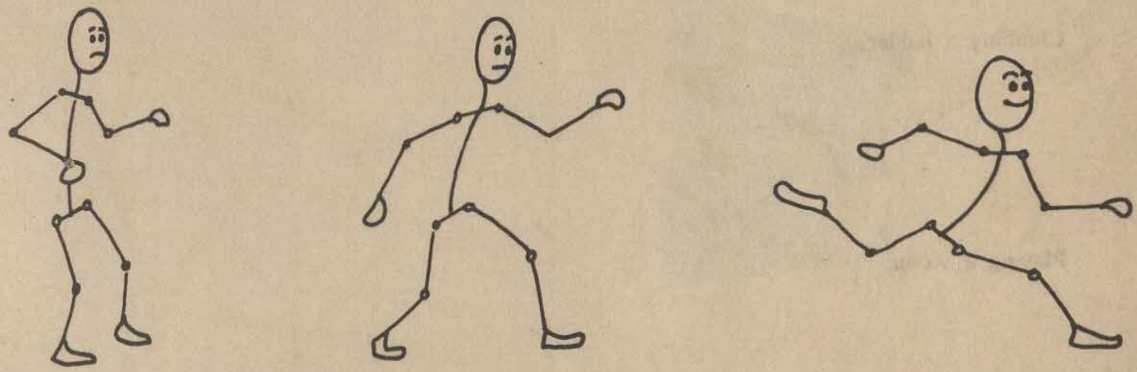
VISUALIZING WITH STICK FIGURES

The use of stick figures is another common form of pictorial expression for the teacher who is not experienced in drawing. Simple stick figures can be used as visual symbols at all levels of instruction from the elementary class through college. A stick figure will often create unusual interest as a substitute for words, if inserted at the proper place in a chalkboard presentation. Such devices are not only used for creating interest and motivating the student, but to help interpret certain concepts that are difficult to understand.

The changing of a few simple lines will make the stick man walk or run, smile or frown, or be doing a number of different things planned in advance by the instructor. With the addition of a few pieces of simple furniture or tools the stick figure can be placed at a desk, on a chair, or may use a variety of symbolic equipment.

The person who plans to draw stick figures should make a study of the many different positions of the human body. The figure can be standing, walking, running, bending—the position of the head, back, arms, hands, legs and feet will determine what the person is doing. A few minutes of practice each day will help place the different parts of the body in the desired positions.

To use stick figures successfully the instructor must first determine whether such simple visual symbols would help clarify certain concepts in the presentation. Next, what type of figures would do the job.



11. Draw the three stick figures. (Note the simple method of changing the expression on the three different figures.)

After you have practiced making simple stick figures in different positions, try adding simple furniture or equipment so the figure can be doing something. At first, it is best to use simple things like having the figure sweep the floor, rake the lawn, bat a ball, or kick a football. Later other more complex actions can be added as you develop skill.

12. Draw stick figures of a man doing the following things:

Batting a ball:

Climbing a ladder:

Playing a violin:

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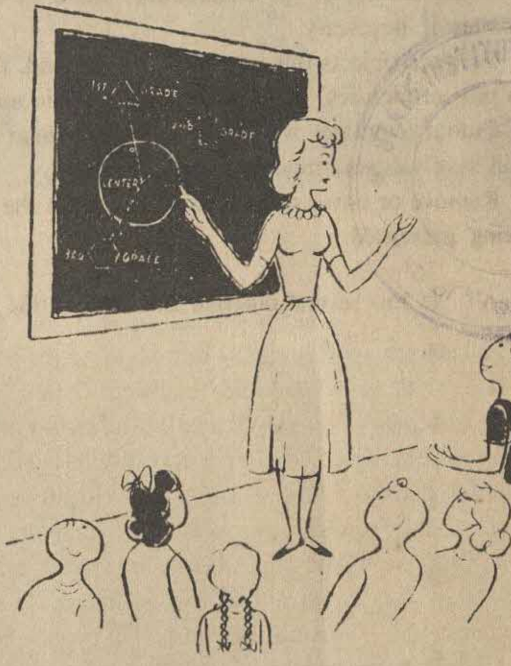

4

CHALKBOARDS

WITHIN THE past few years, blackboards have come to be known as chalkboards, because they are no longer produced only in the black or gray color.

The chalkboard, since its inception, has been one of the most commonly used visual materials in the classroom, lecture room, and laboratory. Many teachers have developed unusual skill in chalkboard presentations, while others have neglected to practice even the simple techniques necessary to make satisfactory presentations. Since the chalkboard is usually available in every classroom, teachers should plan and practice chalkboard presentations much the same as they plan and practice other teaching techniques. The teacher who can vitalize the lesson through good, clear, well-proportioned illustrations will be a more valuable teacher.

Why Do We Use the Chalkboard?

The chalkboard is one of the quickest and easiest—and often the only—means of illustrating an important point. It is immediately available for both the teacher and the pupil to use in visualizing subject matter. It can add variety and contrast to teaching. It can be erased quickly and new material added as the lesson progresses.

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Simple Chalkboard Techniques

The following simple techniques should prove helpful in improving your chalkboard presentations:

Don't confine the material to small detailed drawings; work in large patterns.

Test the size of your writing to be sure that it is legible from the last row of chairs in the classroom. If your writing is not easily read, print.

Plan a neat, orderly presentation.

Develop one point at a time.

When talking at the chalkboard, stand to one side of your material so all the class can see. Use a pointer if necessary.

To trace objects difficult to draw freehand, the lantern slide, opaque, and filmstrip projector can be used to project pictures, maps, and other graphic materials onto the chalkboard.

Cutout templates will assist in making neat drawings. Templates cut of cardboard, wood, or masonite will save valuable time at the chalkboard.

Remove or cover distracting material on the chalkboard so that students will concentrate on the material being presented.

1. List several different functions of the chalkboard in your own subject matter field or grade level.

a.

b.

c.

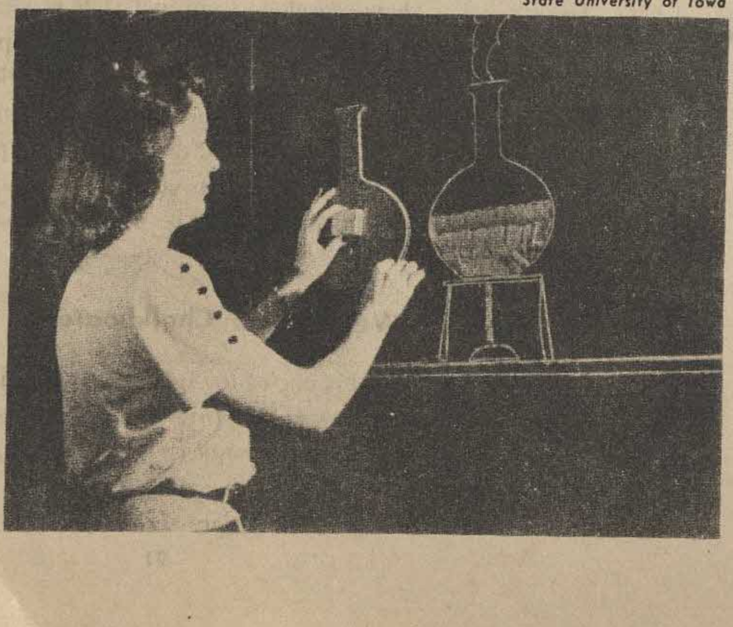
d.

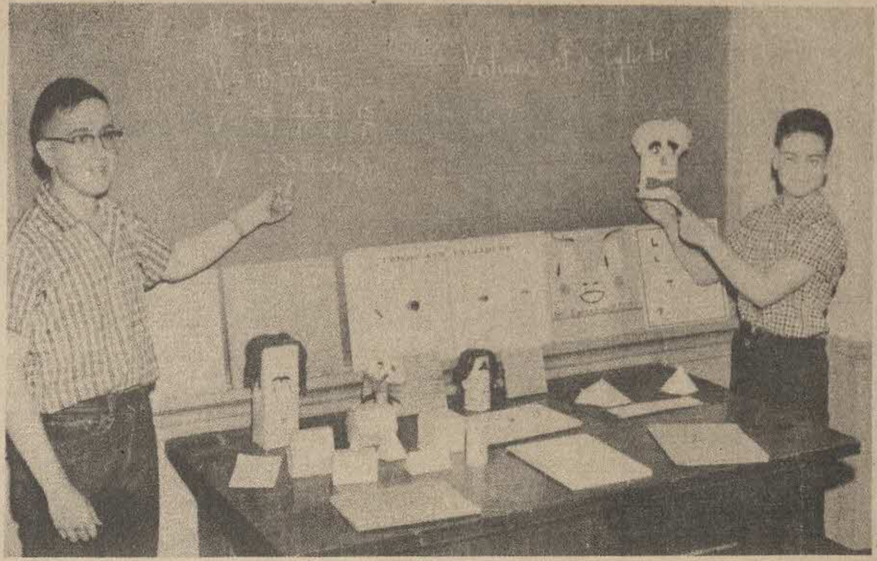
e.

f.

TEMPLATES WILL IMPROVE CHALKBOARD PRESENTATIONS.

State University of Iowa





CHALKBOARD COMBINED WITH DEMONSTRATION TABLE.

Atlanta Public Schools

Factors to Consider in Using the Chalkboard

Preparing materials on the chalkboard in advance of the class period often saves the time of both teacher and pupil. In certain instances the instructor may wish to make the sketch during the class if the drawing is of the developmental type. A series of drawings and sketches on the chalkboard in view of the entire class may have a distracting influence and make the presentation less effective. Some instructors cover chalkboard drawings and sketches with wrapping paper, a pull-down curtain, or a projection screen and then uncover the material one step at a time to give the full impact of the illustration. A confused series of drawings on the chalkboard may be so distracting to the students as to be of little value. Other devices found to be of great value in chalkboard presentations are prepared patterns, the grid technique, and chalkboard drawing instruments. The prepared pattern method utilizes holes punched at intervals in cardboard or window shade cloth covered with chalk dust to establish outlines of often used objects. The grid technique is used to transfer a small picture to the chalkboard; horizontal and vertical grids are drawn over the picture and the grid is enlarged to a different scale on the chalkboard. This technique is often used by teachers who cannot make satisfactory freehand sketches.

It is recommended that the chalkboard be used as a teaching device, not as a place for general announcements and other miscellaneous school information.

2. Chalkboard drawing devices will aid the teacher and pupils in making good presentations. List four chalkboard drawing devices that would be of greatest assistance to you.

a.

b.

c.

d.

3. Locate a picture 8″ x 8″ or larger and using the grid technique reduce the picture to 4″ x 4″ in size in the space below.

Colored chalk is often useful and can serve many different purposes in drawing and sketching on the chalkboard. Color should be used for specific purposes, either to make the illustration more natural or to differentiate between certain parts of the drawing for emphasis. Children enjoy using colored chalk in preparing student projects.

4. Indicate several ways in which colored chalk would assist in your teaching.

a.

b.

c.

d.

e.

5. In the space below make a chalkboard layout for a specific lesson in your own subject matter field or grade level.

6. At what distance from the floor should the bottom of the chalkboard be located for first grade children?

7. What size letters should be used on the chalkboard to be easily seen from the back of a thirty-foot classroom?

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"Make Your Chalk Talk," 57 frames, sd., or si., b&w, The Jam Handy Organization, 1942.

"Make Your Chalk Teach," 47 frames, si., b&w or color, Wayne University, Audio-Visual Materials Consultation Bureau, 1951.

Our Picture File
We brought pictures. We use our file.

Los Angeles Public Schools

5

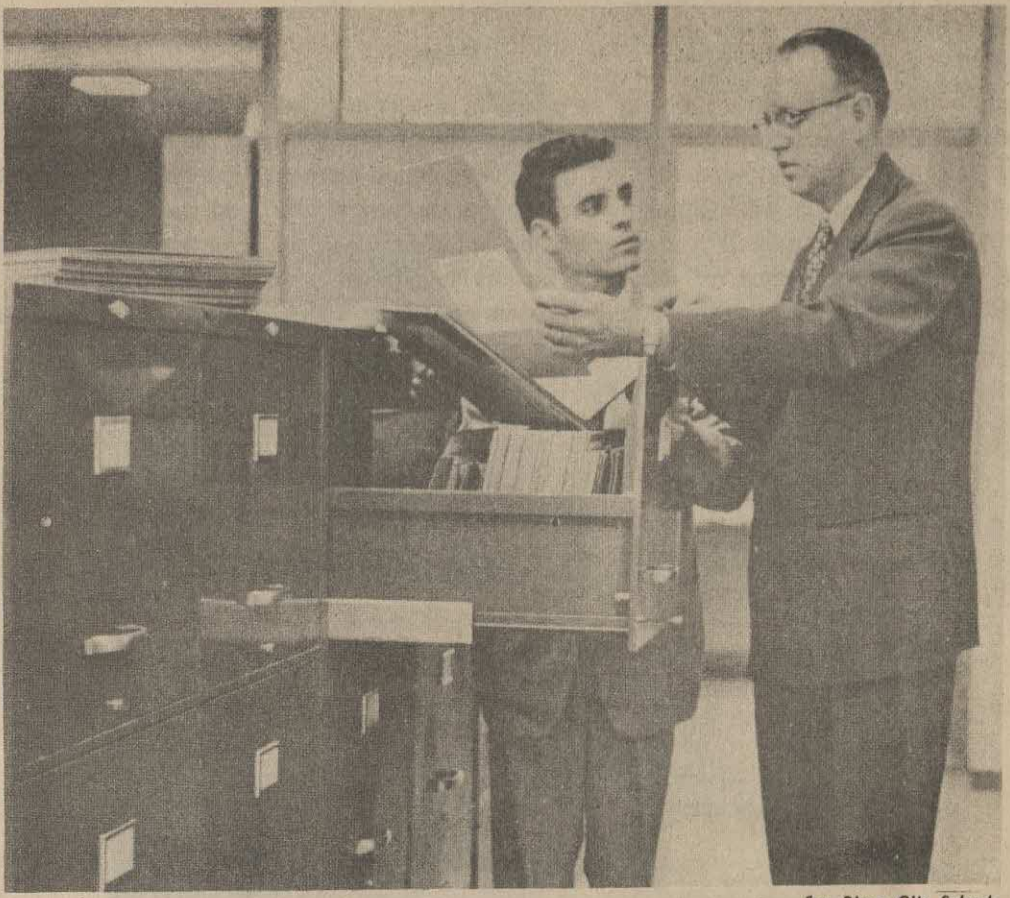
FLAT PICTURES AND PICTURE FILES

TODAY AS never before, pictures are available for classroom use from a wide variety of sources—newspapers, magazines, brochures, and books. Drawings, paintings, cartoons, illustrations, photographs, and stereographs provide teachers with a wealth of effective, inexpensive materials that are simple to procure and easy to use.

Still pictures help provide motivation for students and bring interest to the learning situation. They assist in developing language, art, and creative expressions such as storytelling, dramatization, reading, writing, painting, and drawing, and help students interpret and remember the content of accompanying textual material. Social understanding can also be developed through their use. In many situations they provide the best source materials for study and investigation. Pictures add variety to teaching, for they can be used with individuals, small work groups, or when projected, with even the largest classes.

Using Pictures

Still pictures, like all other teaching materials should be selected and used with specific purposes in mind. They do not do the teaching job alone and must be integrated with particular lessons. It is not wise to use too many pictures at a time; select a few key pictures you feel will best develop understandings.



San Diego City Schools

THE AUDIO-VISUAL SPECIALIST HELPING THE TEACHER FIND STUDY PRINTS.

Pictures may be used by individual students for picture reading exercises. They may also be used for special reports, bulletin board displays, or as the basis for further reading and study.

Small groups can also use pictures to advantage. Pictures can be collected or selected by students to be used for special interests. Pictures can be used as a basis for group reports and as reference materials for study and research.

The meanings and understandings which students gain from pictures may differ from one student to another. Therefore the teacher must take time to teach students how to "read" pictures.

Most teachers are familiar with the use of pictures for presenting ideas to an entire class. They can be used as background displays on the walls, as exhibit and bulletin board displays, as visual tests for motivation or review, or as common learning experiences in developing understandings. However, many times pictures are too small for the entire group to see, and the opaque projector must be used to enlarge the image.

1. List several of the most common mistakes teachers make in using pictures.

a.

b.

c.

d.

Study Prints

Several commercial companies and some large school district audio-visual centers have produced sets of pictures dealing with various subjects, such as transportation, life in foreign lands, etc. These sets of study prints have been carefully prepared. All of the pictures are the same size, large enough to be used for class study, and include an explanation of the picture on the reverse side. All pictures in some sets are punched with small holes to facilitate pinning or tacking on bulletin boards. Some sets have been laminated (embedded in plastic) or treated for protection against fingerprints, marks, or other damage. Sets of study prints provide a comprehensive pictorial overview of specific topics, and are particularly helpful in presenting, usually, content materials in which sequential steps of a process are important.

Los Angeles Public Schools

USING A PICTURE FILE IN ELEMENTARY SCIENCE.

2. List three sources from which sets of study prints can be purchased.

a.

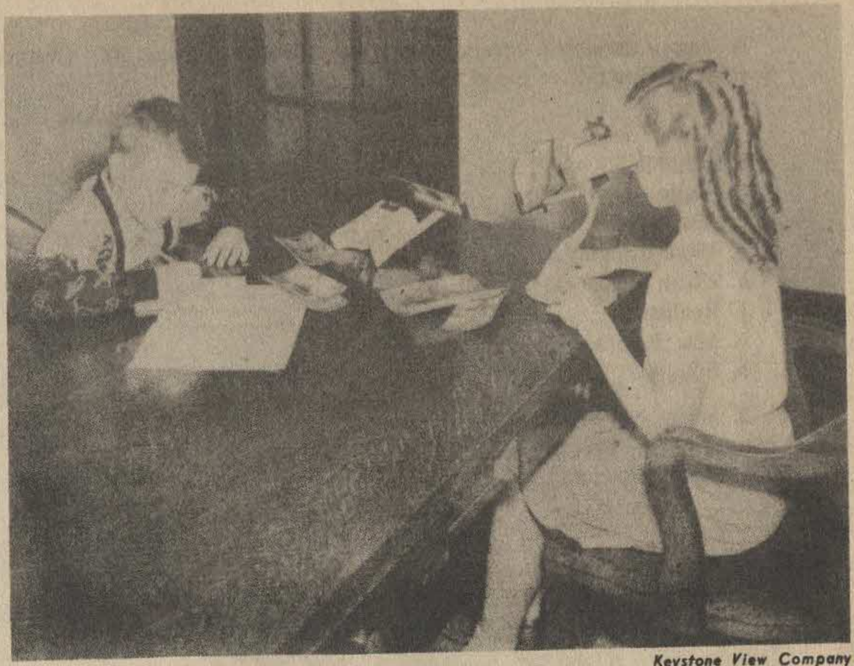
b.

c.

Stereographs

Stereographs, when viewed through a stereoscope, provide the individual viewer with the additional third dimension of depth. Three-dimensional still pictures have been used for almost a century. Stereoscopes (the viewing instrument) and stereographs (the pictures themselves) were used in homes during the 1890's. In a presentation of any subject in which the sensation of depth is important to understanding, the teacher will find the stereoscope a valuable device. Cameras are now available for making both stereo slides and stereo motion pictures, but a stereoscope or special viewing glasses must be used by the viewer to receive the sensation of depth. There are also several companies that produce these materials for classroom use.

THE STEREOGRAPH PROVIDES THE THIRD DIMENSION OF DEPTH IN PICTORIAL MATERIAL.
DEPTH IS IMPORTANT IN CERTAIN TYPES OF INSTRUCTION.



Keystone View Company

value would third dimension (depth) be in your teaching?

Developing a Picture File

There are several steps involved in developing a picture file—selecting, mounting, classifying, and filing.

Selection

Pictures can be collected and selected by students and teachers; however, there are several general questions that should be answered before the selection process starts. Who are the students? What are the purposes or objectives in collecting and using the pictures? Will they add to the students' knowledge? Why are pictures being used? How are they going to be used?

After determining the general value of the picture, it should be viewed with some specific criteria in mind, such as:

Suitability—will it contribute to learning situation?

Artistic—does it meet artistic standards?

Technically correct—does it actually show what it is supposed to present?

Well composed—does it have a center of interest or is it confusing in appearance?

Clear in detail—are the details clear and meaningful or are there too many details?

Realistic—is it truthful or has it been poorly "staged"?

Size related—are there familiar objects in the picture so that students can determine relative sizes?

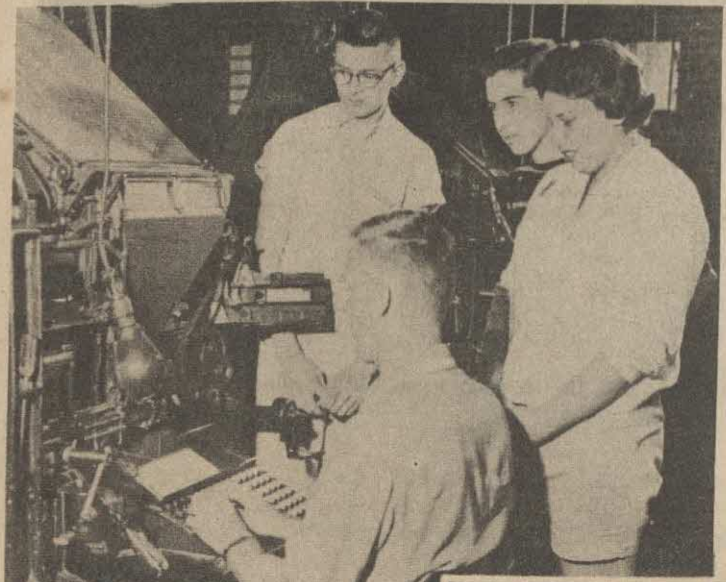
Effective in color or contrast—if color is used, are the colors true and meaningful? If black and white is used, are contrasts sharp and clear?

4. Apply the above criteria to the two pictures on page 30. Evaluate these pictures. (5 = Excellent, 4 = Very Good, 3 = Good, 2 = Fair, 1 = Poor)

	Picture A					Picture B				
	5	4	3	2	1	5	4	3	2	1
a. Suitable										
b. Technically Correct										
c. Artistic										
d. Well Composed										
e. Clear in Detail										
f. Realistic										
g. Size Related										
h. Effective										

5. Select one of the two pictures that you would like best for instructional purposes and describe your reasons.

I select picture #______. My reasons are as follows:

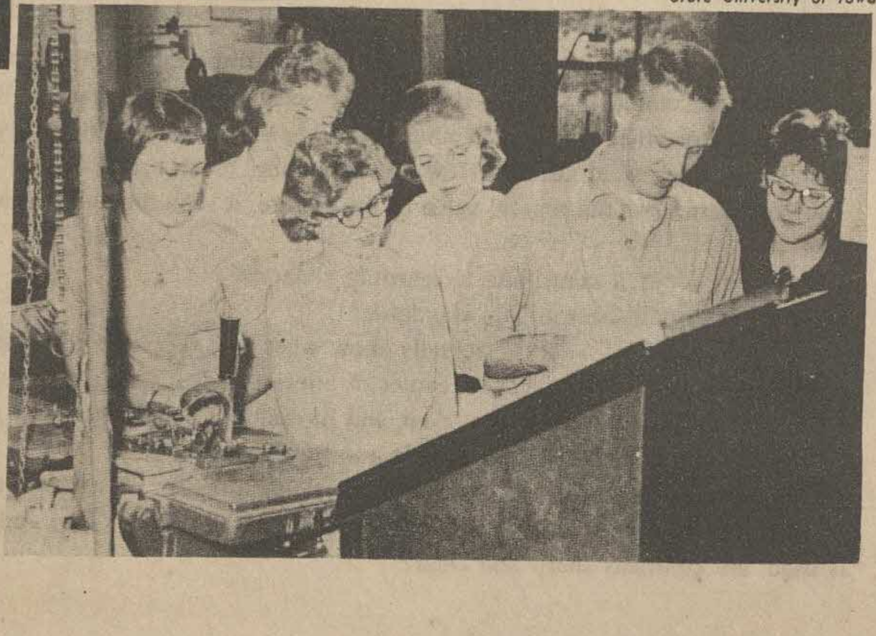


A

WHICH PICTURE WOULD YOU SELECT FOR INSTRUCTIONAL PURPOSES?

B

State University of Iowa



MOUNTING PICTURES ON PERMANENT MOUNTS.

San Diego City Schools

Mounting

The lack of proper mounting has often caused the waste of valuable pictures; however, the type of mounting to use depends upon the quality of the picture and its future use.

There are several general points to remember in mounting pictures:

Avoid a cheap appearance.
Make mountings neat, attractive, and artistic.
Standardize size of mountings when possible.
Select the proper adhesive.
Avoid glare or reflection.
Use either neutral or harmonious backgrounds.
Use a generous margin, with the bottom margin the widest.
Provide captions or labels on the back for identification.

San Diego City Schools

SPRAYING PERMANENTLY MOUNTED PICTURES FOR PROTECTION.

Types of Mounting

There are two kinds of mounting in common use, temporary and permanent. Temporary mounting is advisable if the pictures are not valuable, if they are not going to be used again, if they are of poor quality, or if there isn't time to mount them permanently. Permanent mounting is recommended for all pictures that are to be used frequently.

Temporary Mounting

Straight pins and round-head pins are best for attaching pictures to backgrounds. Thumbtacks can also be used, but the shiny appearance is sometimes distracting.

Paste, rubber cement, or mucilage touched under the top of the picture will hold it straight and even. Masking tape or colored scotch tape, used to secure the picture on all four sides, often adds brightness and variety.

6. Place on the space below a small temporarily-mounted picture with a background mounting. Keep in mind the criteria for selecting pictures and the characteristics of good mounting.

Permanent Mounting

There are several methods of permanent mounting, depending upon the size of the material, the supplies available, and the purpose for which the pictures will be used.

Floating, or covering of the entire back of the picture with adhesive, is the most common. Paste, rubber cement, mucilage, or glue can be used. Of these, special paste or rubber cement are most highly recommended to prevent the picture or the mounting from warping. Rubber cement should not be used if the pictures are to be projected in an opaque projector because the heat will loosen the cement. Cardboard or canvas can be used for mounting, depending upon the size of the picture.

Wet mounting, or the process of fastening pictorial materials to canvas, muslin, or similar materials, is recommended for large charts and maps.

Dry mounting with mounting tissue is somewhat more expensive but is very effective. The tissue is placed between picture and mounting board and is pressed with a hot iron or a thermal press, forming a strong bond.

Lamination is a process of imbedding pictures between two pieces of plastic. If your school system doesn't have access to a laminating machine, you can have this work done for you at a commercial plastic company. This system is somewhat costly for individual flat picture collections.

Protecting Mounted Prints

Permanently mounted prints may be protected from fingerprints, dust, dirt, and other damage in a number of ways. Clear plastic, available in pressurized cans, can be sprayed on lightly. Clear lacquer which has been diluted with lacquer thinner may be sprayed on with a blower or a fly spray gun. In either case, spray lightly. Several light coats will provide more even distribution and prevent streaks or bubbles. Cellophane sheets can be placed over the picture and cemented to the back. Pictures can also be encased in cellophane envelopes.

Cellulose acetate sheets in either dull or glossy finish can be purchased at your local camera shop. These sheets are protected on the gummy side with waxed paper. When the waxed paper is removed, the acetate will adhere to the picture, giving a tight protection.

7. Place in the space below a small, permanently mounted picture. Experiment with permanent mounting materials with which you are not familiar. Also try one of the various types of protective-cover methods mentioned above.

Filing and Classifying

"A picture is only as valuable as it is accessible."[1] Regardless of the number of kinds of pictures a teacher has, they are of little value unless they can be located and used at the time they are needed. Filing and classifying pictures insure their easy identification and location. The development of a filing system depends upon the type of file desired. Picture collections may be developed for an individual teacher, a departmental collection, or a school or city collection. Files will have many characteristics in common, although they may differ in terms of quantity, quality, and type of mounting required.

Dade County Board of Public Instruction, Florida

METHOD OF FILING FLAT MOUNTED PICTURES.

Filing

The method of storing pictures will depend to a great extent upon the size and type of filing device available. Effort should be made to standardize the size of pictures for ease in storing. Manila folders or envelopes are inexpensive materials for keeping together a series of pictures dealing with the same subject. These folders or envelopes can be kept in either 8½" x 11" folders or legal size file drawers. If a filing cabinet is not available, cardboard cartons can be used for filing the folders.

Classifying

Any system of classification may be used for locating pictures easily and quickly. Unless picture collections are extremely large, classifications such as the Dewey Decimal System are not recommended.

Small teacher collections can be classified by teaching unit if desired. A more effective method, however, is to develop a system of subject headings with subheadings:

---

[1] Etta Schneider Ress, *The Use of Pictures to Enrich School Resources* (Mankato, Minn.: Creative Education Society, Inc., 1953.)

SELECTING A PICTURE FOR A REPORT.

Los Angeles Public Schools

A. Farm Animals
   1. Horses
   2. Pigs
   3. Sheep

B. Pets
   1. Dogs
   2. Cats
   3. Guinea Pigs

C. Wild Animals
   1. Lions
   2. Bears
   3. Elephants

Helpful suggestions for developing a classification system can be procured from the Vertical File Service Catalog, the Standard Catalog for High School Librarians, and the Educational Film Index. These basic references can be found in most school or public libraries.

When the headings and subheadings have been determined, a card file should be developed that will include basic information on each picture in the collection. On the back of each picture should be a label containing the same information as the card in the card file. This will assist the easy return of the picture to the proper file and give pertinent information about the picture itself. If the collection is to become extensive, it would be advisable to consider some type of cross-indexing system to aid in locating desired pictures.

Still pictures can be collected and picture files developed by both students and teachers. These inexpensive, effective teaching tools are within easy grasp of any teacher and help make instruction clear and meaningful.

8. List five sources of free or inexpensive flat pictures.

a.

b.

c.

d.

e.

9. Develop, in the space below, one category of a simple classification system for a picture collection in your own subject field including: sample headings and subheadings, and a card for the picture. (For example, Transportation, Animals, Tools, etc.)

Picture File

Picture File Card

A.
  1.
  2.
  3.

B.
  1.
  2.
  3.

10. List four different ways you would use still pictures in your own teaching.

a.

b.

c.

d.

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Ransohoff, Daniel J., *Pictures Tell Your Story*. New York: National Publicity Council, 1959.

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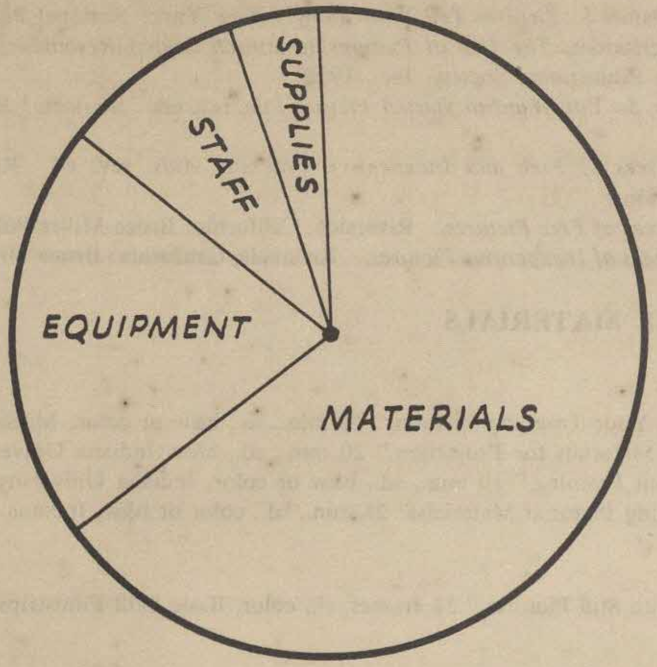
"Handmade Materials for Projection," 20 min., sd., b&w, Indiana University, 1956.
"Passe Partout Framing," 10 min., sd., b&w or color, Indiana University, 1956.
"Wet Mounting Pictorial Materials," 28 min., sd., color or b&w, Indiana University, 1953.

Filmstrips:

"Teaching with Still Pictures," 53 frames, si., color, Basic Skill Filmstrips, 1959.



6

CHARTS AND GRAPHS

THE TERMS *chart* and *graph*, as used in modern education, have changed somewhat from the original usage. Formerly, *chart* usually referred to a type of map used for navigation, an outline map exhibiting temperature variations, or perhaps a sheet giving tabular information. Present usage of the term includes a wide variety of graphic and pictorial material. The word *graph* was used primarily to refer to line graphs and for certain mathematical graphs. Current usage has expanded the term to include many variations of this teaching device.

How to Use Charts and Graphs

Charts and graphs are needed in the instructional program as a means of breaking down cold statistics into a language that can be understood by the student. Factual information as printed or written in statistical form is understood by the scholar but has little meaning to the student. Facts can often be built into charts or graphs that quickly clarify meanings and often save considerable time in the presentation.

When using charts and graphs teachers must always keep in mind that these materials are symbolic. The student needs a background of information to which the graphic information can be related. He must understand the symbols used and why certain ones represent specific things. Although elementary school pupils have seen charts in books and on television, the skill of reading such materials needs to be developed in the classroom. Simple pictographs can be introduced at about the fourth grade level to develop the pupil's ability to understand the symbols used, the ability to read such graphs and develop certain conclusions. In grades seven through nine the additional knowledge regarding other types of simple graphs such as the bar, divided circle and line graph should be introduced. Students at these grade levels should develop the ability to read such graphs, compare the information, and use the knowledge in relation to other course content. At the upper secondary grade levels students should be able to read all types of charts and graphs, relate them to the learning situation, and develop a knowledge regarding which type of charts or graphs to use in presenting different kinds of facts. Charts and graphs are a means of getting the student to think, compare, relate, and use factual information.

Types of Charts

In recent years teachers have developed many new types of charts and have found new uses for them. The more common types of charts used today are:

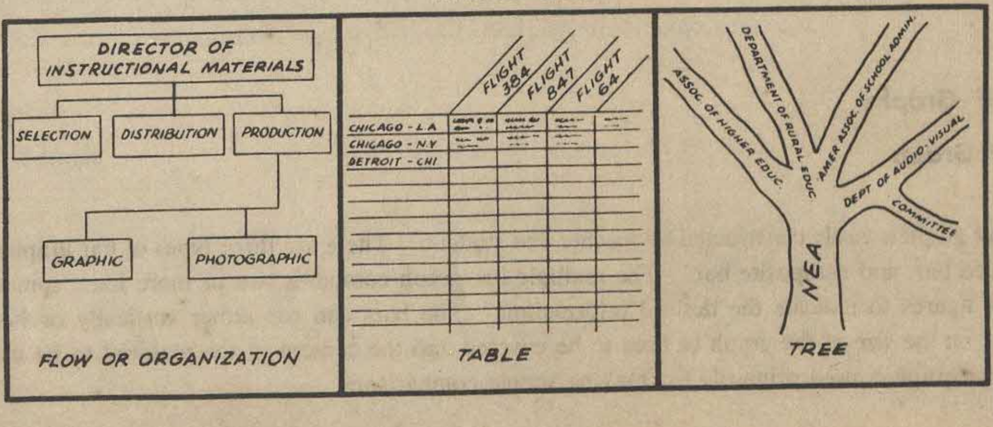
Flow Chart

This is referred to as an organizational chart. It can be used for showing the organization of almost anything, from the individual school to city, state, or national government. It is often used in industry to show organization from the top down to the very smallest segment of the company, and how each section is responsible to each other. All branches of government use the flow chart to indicate to employees the relation of their specific office to the over-all organization of the department.

Table Chart

Such charts are commonly used in education, and usually refer to such things as timetables, or tables where time is important. The number of accidents related to the months of the year in a given state or city might be made on a table chart. The amount of funds spent from a budget each week would be another example. The "strip-tease" technique is often used on table charts by covering the lines with blank paper and removing them at the proper time for special emphasis.

TYPES OF CHARTS



Tree Chart

A tree chart is shown as a tree with branches and can be used for demonstrating relationship or development. It is often used to trace the history of a family, starting with the first known members as the trunk, and each branch on the tree representing children of the original family. The tree chart can be used for tracing the development of many other things, a good example being the growth of a company, with the branches of the tree showing new plants.

Other types of charts, such as process or distribution, classification, genealogy, relationship, data, pictorial, diagrammatic, exploded view, and progress charts are commonly used.

1. In magazines or newspapers select two types of charts and mount them below:

2. Select one of the above charts and tell how you would use it.

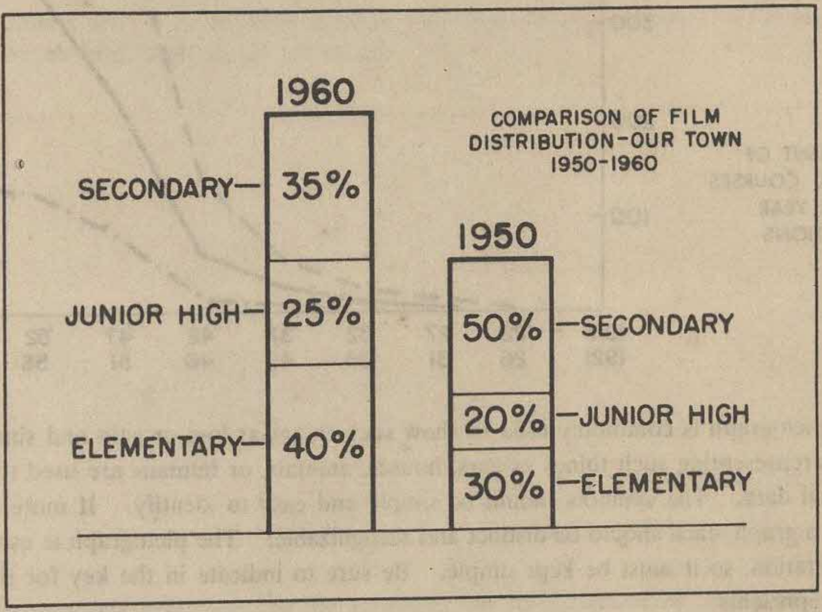
Types of Graphs

Bar Graph

A bar graph is easily constructed by teacher and student. There are three types of bar graphs: multiple bar, divided bar, and composite bar. The multiple bar graph compares two or more bars, sometimes with a scale of figures to indicate the desired information. The bars can run either vertically or horizontally, depending on the size of the graph or area to be covered and the content of the material to be used. This form of bar graph is used primarily for making simple comparisons.

The divided bar graph can be one or more bars with each bar divided by lines, color, or shading to indicate different divisions, as in the breakdown of a budget. In making a divided bar graph of a budget, each bar might represent a different year's budget and the divisions within the individual bars would indicate percentages of budget for different items.

The composite bar graph is usually a series of bars using divided bars but with comparisons or lines running from one bar to the other to indicate growth or difference at a given time. Such graphs are often used to show more complicated types of comparisons.



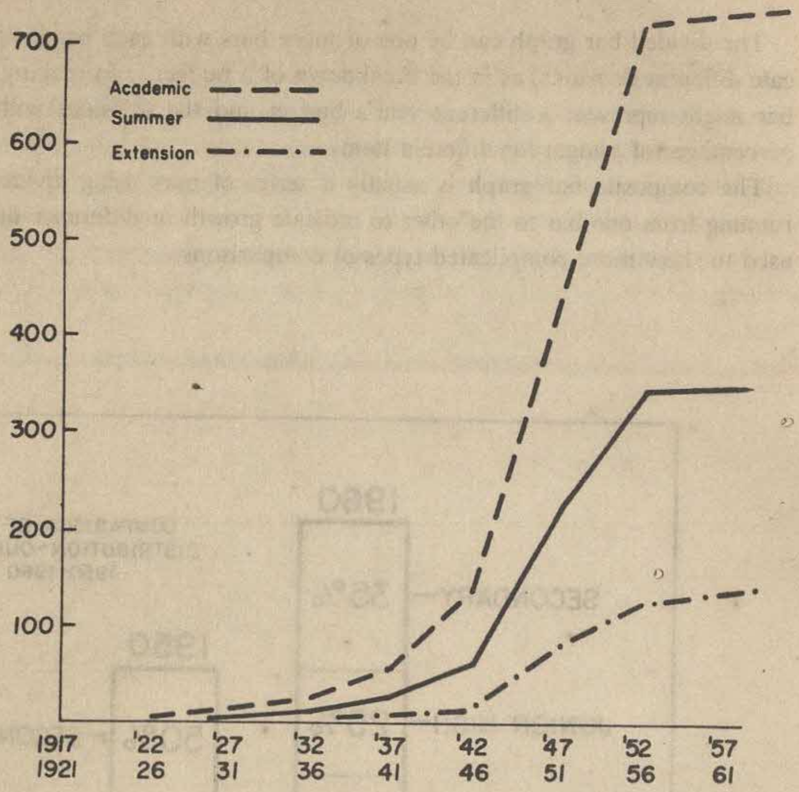
DISTRIBUTION OF
EDUCATIONAL FILMS

Divided Circle Graph

Familiar to nearly everyone is the pie graph. It is made by drawing a circle, dividing the circle into segments to represent different parts of a whole, and indicating the meaning of each segment by lettering. The divided circle graph can be used for many different comparisons. Since it is easily made, many teachers and students use this form of graph when some other type would be more effective.

Line Graph

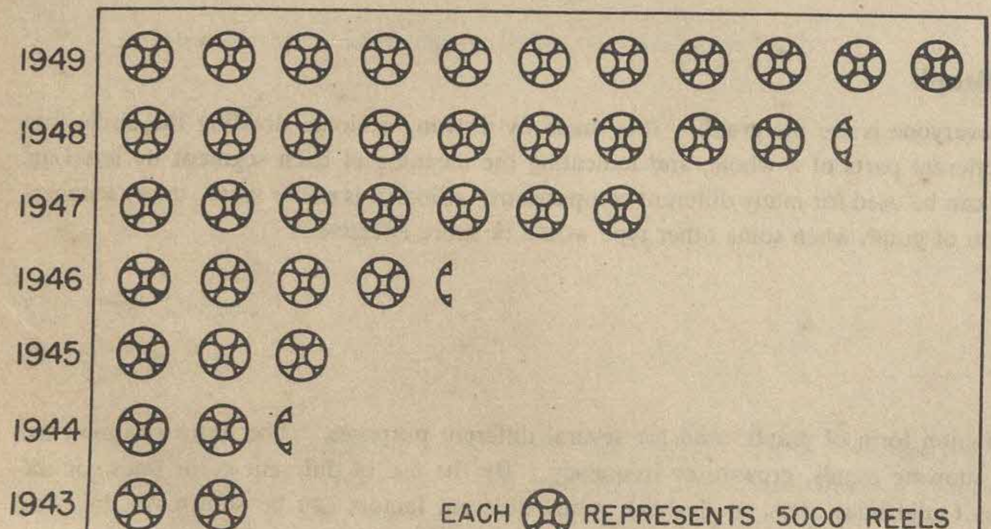
This is another common form of graph, used for several different purposes. The more common use for the line graph is in showing trends, growth, or frequency. By the use of different color lines, or different forms of the lines (solid lines, dots, or dashes), many different factors can be shown on the same graph. The line graph is characterized by a grid of horizontal and vertical lines. The horizontal lines can represent different years and the vertical lines quantity, percentage, or other factors. There is no rigid rule indicating whether horizontal or vertical lines shall represent a certain factor. A line graph is often more difficult to read than other forms of graphs.



DEVELOPMENT OF AUDIO-VISUAL COURSES BY FOUR YEAR INSTITUTIONS

Pictograph

Relatively new, the pictograph is commonly used to show such things as loss or gain and simple comparisons. Small symbols representing such things as cars, houses, animals, or humans are used to indicate numbers or other statistical data. The symbols should be simple and easy to identify. If more than one kind of symbol is used on a graph, each should be distinct and recognizable. The pictograph is used to give a quick, interesting presentation, so it must be kept simple. Be sure to indicate in the key for this graph the amount each symbol represents.



FILMS DISTRIBUTED BY LIBRARY (A) DURING PERIOD 1953 TO 1960

Practical Suggestions for Making Graphs

Graphs should be kept simple and easy to read. A complicated graph is of little value in teaching and is often more confusing than helpful. Use keys or labels for graphs when necessary. Labels should be easily read and understood. Make the graph large enough to be seen easily in the room where you plan to use it. If the graph is to be made into a photographic lantern slide or overhead transparency for projection, be sure the legends and the figures are of a size that can be reduced in proportion to the entire graph. Color on graphs often helps give emphasis to certain desired details that might be hard to present in other ways. Make your graphs tell a story.

3. Draw a divided circle graph showing your approximate expenditure of money during the past month for food, clothing, shelter, and recreation.

INSTITUTE OF EDUCATION
West Bengal

4. Draw a line graph showing the growth or loss in population of your home town during the past ten years.

5. Indicate two different types of information you could present by graphs in your subject field or grade level.

Information	*Type of Graph*
a.	
b.	

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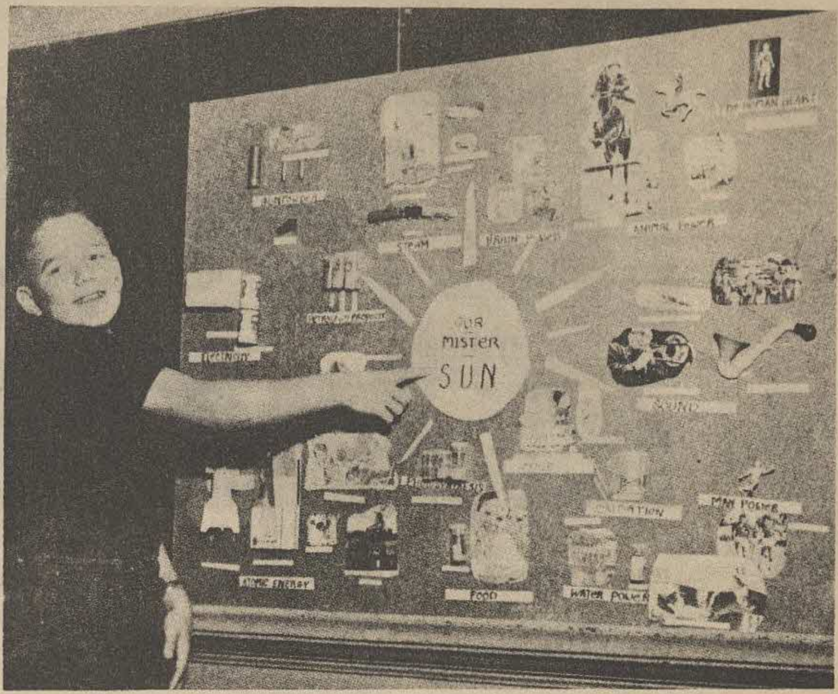


Atlanta Board of Education

BULLETIN BOARDS

7

THE BULLETIN BOARD is one of our oldest methods of visualizing organized instruction. For years we have used posted pictorial material and announcements to tell others about things that were to happen, or to help instruct our children. Bulletin boards in the modern school play an important part in the everyday instructional program; they supplement text material and provide an opportunity for both student and teacher to express themselves through the medium of displayed materials. The experienced teacher has found that the bulletin board is much more than a place to put school announcements and interesting pictures. The planned bulletin board can be of importance in nearly every phase of the instructional program. It can be used to motivate the student, develop interesting phases of the unit of study, announce new units of study, serve as a point of reference for introducing other types of audio-visual materials, and to serve as a place for student displays of individual and group projects.

The bulletin board and the chalkboard are two of the minimum visual needs in every classroom. The primary function of the bulletin board is to provide the teacher with satisfactory space and surface where he can visualize and vitalize the course of study with a constantly changing, planned series of materials. The resourceful teacher will plan specific bulletin board presentations to meet many different problems within the course of study. In addition, he should motivate student projects that will result in student-planned and -constructed displays. The classroom must provide an interesting environment if children are to learn. The bulletin board can make an important contribution to a pleasing, interesting, refreshing classroom, if planned to meet specific objectives.

San Diego City Schools

TEACHER USING A COMBINATION OF BULLETIN BOARD AND PROJECT TABLE.

Location, Type of Materials, and Color

The location of the bulletin board in the classroom is important and will differ according to such factors as the age of the children and the normal activity within the room. The bulletin board should be well located and lighted. It should be at the student's eye-level. In many instances, several bulletin boards within a classroom will be found very useful. The background of the board should be a neutral color to develop contrast when colored materials are used. Bulletin boards are made from many different materials, with cork one of the more popular surfaces. Other materials are linoleum, composition board (celotex and beaver board), and soft wood covered with burlap. The surface should be soft enough to allow thumbtacks and pins to be used with ease.

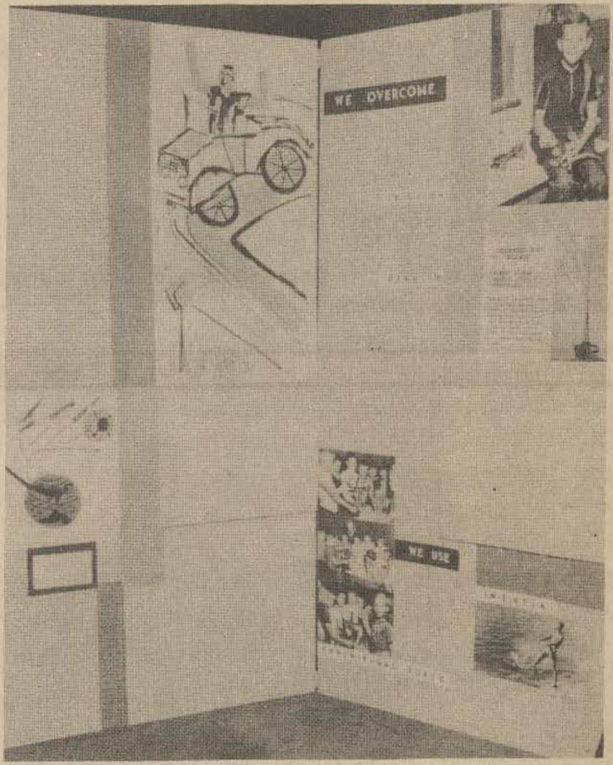
Effective Bulletin Boards

Effective bulletin boards must be planned to meet specific instructional problems. The following outline will be helpful in planning and preparing a bulletin board:

Select a specific topic	Plan the theme of the bulletin board.
Select the right materials	Select only materials that will contribute to the lesson.
Plan the arrangement	The arrangement may be formal or informal.
Use color	Colorful backgrounds, mountings, and accessories catch the eye.
Use neat and clear lettering	Good clear letters will make the board more attractive.
Create the proper atmosphere	Atmosphere can be created in different ways by using seasonal colors, color combinations, and the style of lettering.
Make the arrangement tell a story	Through arrangement and well-planned labels, tell a story.
Add eyecatchers to the display	A spot of color, an interesting design helps the display.
Avoid crowding the exhibit	Space materials on the board to avoid a crowded appearance.
Hide the mechanics of the display	Attach materials to the board in a way that will keep the mechanics (tacks, pins, etc.) as unobtrusive as possible.
Use originality in your bulletin boards	The original bulletin board will be more interesting and a challenge to the students.

Student-planned Projects

One of the most effective uses of the bulletin board is the display, planned and constructed by students. Teachers should encourage individual or group planning of displays and exhibits that relate to the course. Pupil-prepared displays should be evaluated by the class as well as by the teacher. The skill students develop in planning, collecting, lettering, and arranging the display are valuable learning experiences. The bulletin board can also be used effectively as a means of displaying student work such as written material, art work, and the like. The student's work usually improves if it is displayed for the entire class to view.



INSTRUCTIONAL WALLS ARE BEING PLANNED IN MANY NEW SCHOOLS AND CAN BE BUILT INTO OLD BUILDINGS.

Atlanta Board of Education

Announcements

If school announcements are to be posted, a separate bulletin board or announcement board should be used. Part of the regular bulletin board, however, can be set aside for this purpose. Don't allow old notices to be left on the announcement board; keep it current.

The bulletin board may include a display of materials, objects, specimens, and models placed on a table below the bulletin board, coordinated as a part of the entire display by the use of string or ribbon. One of the newer developments to assist in arranging bulletin board materials is a product called "Bulletin Board Wax." This wax can be purchased in small sticks; a few sticks will supply the normal classroom for a year. Bulletin board wax as well as other trade name materials such as "Anchor-Dough" is a compound which allows you to mount three dimensional objects as well as flat materials on many different surfaces such as tack boards, chalkboards, walls, woodwork and glass. It is used by applying a small amount of the compound to the object or material to be displayed and pressing firmly against the mounting surface. It will remain in place until removed. When removing materials mounted with such compounds it is suggested that any residue be scraped away. It is a safe, dependable material and will save considerable time in developing displays.

1. Name five specific types of bulletin board display that would assist you in your own subject field. Indicate the purpose of each (for example, motivation, identification).

	Type	*Purpose*
a.		
b.		
c.		
d.		
e.		

2. Plan and outline a bulletin board display for a specific unit in your own subject field or grade level (use the following outline).

BULLETIN BOARD

3. In the space below, develop an evaluation sheet which you would use in appraising bulletin board displays.

BULLETIN BOARDS PREPARED BY YOUR STUDENTS

Items to be Considered	Rating Scale

Atlanta Board of Education

TEACHER AND STUDENTS ARE MAKING GOOD USE OF AN INSTRUCTION WALL IN THIS CLASSROOM.

Instructional Walls

Many modern schools are being planned to provide entire walls for use of all types of instructional materials. Such walls include soft surfaces for fastening different types of materials for large exhibits or displays. In many schools such instructional walls include a certain area where pegboard is installed for easy placement of varied displays, third dimensional materials, and easily moved shelves for presentation of solid objects, specimens and models in addition to pictorial materials. The school of the future should be planned to utilize every possible square foot of wall space as a potential instructional area.

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"Bulletin Boards for Effective Teaching," 12 min., sd., color, Bureau of Audio-Visual Instruction, State University of Iowa, 1953.

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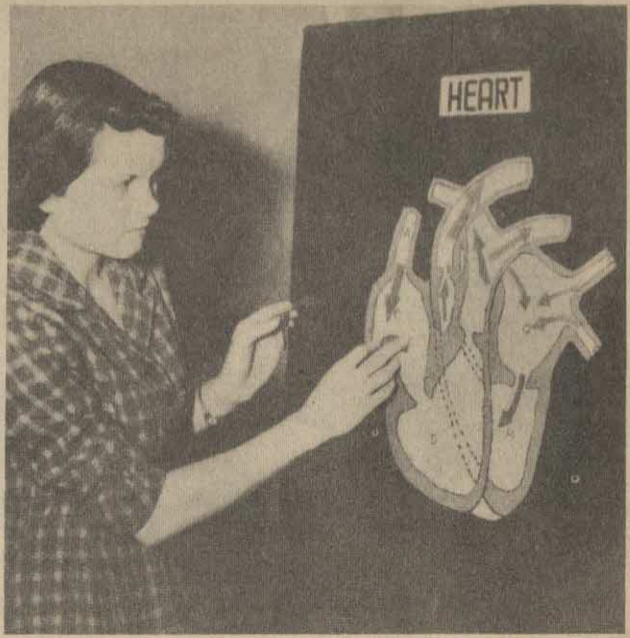


University of Texas

8

FLANNELBOARDS

FLANNELBOARDS, also known as feltboards, have been used for years in Sunday School classrooms for presenting Bible stories. Today, they are being used extensively in schools and industries throughout the country.

The flannelboard consists of a piece of flannel or felt made from wool, cotton, or hair, which is tightly stretched over a strong backing of plywood, Masonite, or Celotex. Because pieces of flannel or felt will adhere to each other, letters, figures, or symbols cut from the same material can be placed on the feltboard where they will stay without the use of tapes, pins, or tacks. Although several companies produce both the flannelboards and cutout materials to use with them, teachers can make their own boards and materials without difficulty. Pictures, cards, and similar material can be made to stick on the flannelboard if small pieces of flannel, felt, adhesive backed flock paper, or coarse sandpaper are glued to their backs.

Flannelboards can be combined with magneticboards for greater flexibility and usefulness. Some flannelboards are constructed with a thin metal sheet or metal screening placed between the backing and the flannel covering, while others are built with a flannelboard covering on one side and a thin piece of sheet metal on the other. Small objects, cards, and similar materials will adhere to the metal, if magnets are glued to their backs.

The magnetic board is particularly useful in teaching team sports, driver safety and note recognition in music. Magnetic boards can be given a coat of background paint and white lines can then be added to outline playing fields, street intersections, or staff lines. Colored checkers or other symbols on which magnets have been glued can be used effectively to simulate players, automobiles, or musical notes.

Dade County Schools, Florida

THE FLANNELBOARD PROVIDES AN INTERESTING LEARNING EXPERIENCE.

Why Use the Flannelboard?

The flannelboard is an extremely versatile instructional device, and it can be used at almost any grade level from kindergarten through college. Processes and procedures can be developed step by step while materials are added, taken off, or moved as the presentation unfolds. By using it, variety and showmanship can be brought to the classroom. Not only is it adaptable, providing teachers with a wealth of demonstration material, but it also allows for student participation.

CHILDREN ENJOY USING THE FLANNELBOARD.

Cleveland Public Schools

1. Give several examples at different grade levels where the flannelboard or magnetic board can be used for clarifying concepts and developing understandings.

Elementary *Examples*

a.

b.

c.

Secondary

a.

b.

c.

College

a.

b.

c.

Using the Flannelboard

Use of the flannelboard in the classroom is not difficult, but preparations must be made before class because materials must be cut out or procured. *Pre-planning* should include answers to the following questions:

a. Why is the flannelboard going to be used?
b. What is going to be presented?
c. Are the cutout materials prepared and ready for use?
d. How is the information going to be presented?
e. Are the students going to participate actively in the presentation?
f. What will the students get out of it?
g. How is student learning going to be evaluated?

Students are often able to produce materials for the teacher or for themselves. When material is to be presented, the flannelboard can be placed in the chalk rail or on a desk easel. Show the material at the specific time it is to be used. And remember that surprise and variety are teaching assets that should be considered in using the flannelboard.

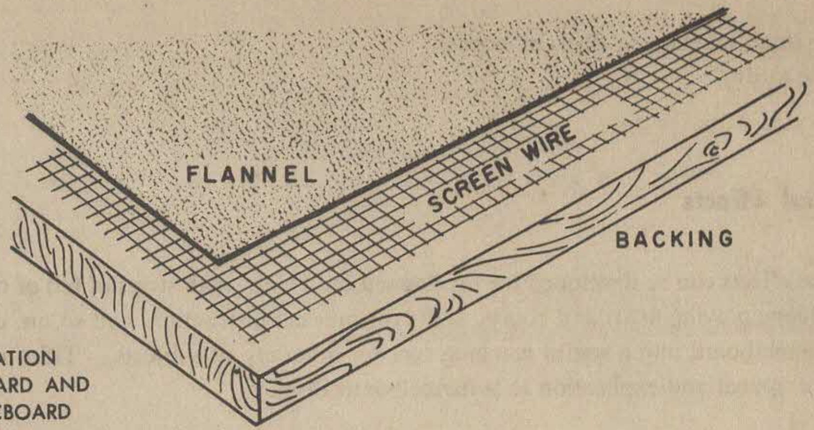
2. Select a topic in your own subject-matter field or grade level that could be effectively presented on flannelboard. Outline your plan of approach, including *Pre-planning* and *Utilization:*

Making Flannelboards and Materials

Although flannelboards can be made in any shape or size desired, a rectangular board with a ratio of three units high by four wide is advisable for most classroom purposes. Many flannelboards are constructed with hinges in the center so they may be folded and stored in a minimum of space.

Needed Materials

a. A piece of mounting board of Celotex, plywood, or Masonite of the desired size.
b. A piece of felt or flannel of a neutral color four inches larger than the board. (For best results, long fibered nap is recommended.)
c. A roll of masking tape for binding.
d. A thin sheet of metal wire screening if magnets are also to be used.



COMBINATION FLANNELBOARD AND MAGNETICBOARD

Procedure

- a. Cut felt at least two inches larger, on all sides, than the mounting board. This will allow for overlapping the edges.
- b. Tack screening or sheet steel to board (if magnets are to be used).
- c. Pull cloth tightly over the mounting board and tack it on the back.
- d. Fold felt neatly at the corners.
- e. Place board on its face, and bind the edges with masking tape. (Staples can also be used for additional strength.)

Materials

Several types of material can be used on the flannelboard depending upon the materials available and the effect desired. Color may often be used to advantage.

Felt Cutouts

- a. Select the outline of the cutout desired.
- b. Trace the outline on a piece of paper.
- c. Pin the pattern to the flannel or felt.
- d. Cut around the pattern.
- e. Color or details may be added with crayon, India or plastic inks, or water colors.

Felt- or Flannel-Backed Paper Materials

- a. Select the picture, drawing, symbol, or emblem desired.
- b. Cut a piece of scrap flannel or felt to cover at least two-thirds of the picture material.
- c. Glue the felt or flannel to the back of the material.

Sandpaper-Backed or Flocked Coated Adhesive Paper Material

- a. Select the picture, drawing, symbol, or emblem desired.
- b. Cut a strip of coarse grain sandpaper or flocked paper to cover at least one-half of the material.
- c. Attach the sandpaper, rough side out, to the back of the material, using mucilage, or paste, peal off the protective wax paper backing of the flock paper and fasten it to the back of the material. (Use small amounts of adhesive to prevent back side of the material from becoming saturated and slick.)

Magnetic Materials

- a. Select the cards, models, or materials desired.

b. Glue small magnets to back or bottom.
c. Allow to dry.

Special Effects

Special effects can be developed for the flannelboard with small strips of felt of different colors or colored yarn. Athletic playing fields and courts, staffs for musical instruction, and so on, can be outlined, to transform the flannelboard into a useful teaching tool for a variety of subjects. Titles made from colored yarns will add eye appeal and explication to a flannelboard display.

3. Design and build a flannelboard for your own instructional use. Select and complete one of the following projects for use with your flannelboard.
   a. Make a series of felt or flannel cutouts to explain a procedure or a process in your own subject matter area.
   b. Select a number of pictures that you can use in teaching. Mount several with felt or flannel back. Mount several others with coarse sandpaper or flock paper.
   c. With a drawing pen, felt brush, Leroy, or other drawing instruments, make a series of flashcards on cardboard. Mount them on either felt or sandpaper.

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Oakland Public Schools, California

9

GLOBES AND MAPS

BEFORE YOU can teach correct concepts of globes and maps, you must have an understanding of the different purposes for which these instructional tools are produced. For instance, if you were teaching the relative size of continents with a Mercator projection map, you would be teaching false concepts. The Mercator projection was developed for navigation, and is quite valuable for this specific purpose because straight lines are used in establishing a compass line. However, the Mercator projection distorts areas the further one moves away from the equator; such a map would therefore be of little value in teaching relative sizes of continents or other areas.

Our grandparents were primarily interested in the adjoining county, city, or state; the new concept in world and international understanding is to know the entire world and its peoples. The use of globes and maps, with other forms of audio-visual materials, will help develop a better understanding of the different countries of the world and of the people who live in them.

A great many people fail to understand maps. This is probably because many teachers themselves do not understand the problems of globe and map instruction. The teaching of globe and map concepts must start with the very simple globe, and progress to simple maps, but always using the globe as a reference. It has been said that the globe is the only true map. This should always be kept in mind when introducing a different type flat map, for students must understand the relation between the globe and the map being used.

Illinois State Normal University

STUDENTS EXPLORE NEW CONTINENTS.

The Globe

The globe is often described as "the earth in miniature, showing true proportions." It is desirable, when introducing globes to children for the first time, to use a simplified political globe that clearly indicates land and water masses with a minimum of detail. From this beginning, other features can be added to the globe; only a minimum of new concepts should be introduced at any one time. While the children are still studying the globe, certain types of maps should be introduced.

The globe can be an effective aid in a variety of ways—as a constant reminder that the earth is nearly round and with associations to other bodies in space, that the earth rotates on an inclined axis in revolution about the sun with important effects on changes of seasons, wind systems and ocean currents, on types of clothing worn around the world, of houses lived in, of foodstuffs eaten, of the necessity for different types of transportation. The globe stands as a constant reminder of the comparative size of continents and nations, of true shapes of routes between places, of longitude and latitude, of time, direction, and distance.

The globe is not without fault since detailed locations and areas are lost on the globe. A three foot wide map of the United States would require a globe over eight feet in diameter.

Globes are available in various sizes from 6″ to 24″, 16″ in diameter being in most common use. A variety of globe mountings are available including the table stand, cradle stand, movable Meridian wall or table mounting, floor stand, and hanging mounting. Determination of the specific purpose of the globe will often help in selecting the type of mounting to be used, thereby making it more usable in the classroom. Recent developments in satellite exploration have made it possible for schools now to purchase electrically driven satellite globes. These are used to teach such modern concepts as "the earth rotates while the satellite revolves around it," and "the path of any satellite varies only slightly once it is in orbit, but the position of any point on the earth's surface in relation to the satellite changes with each revolution."

1. List five (5) concepts in teaching geography which make it necessary to use the globe.

a.

b.

c.

d.

e.

2. Name three popular types of globe mounting used in classrooms, and indicate the special purpose of each.

Mounting	*Purpose*
a.	a.
b.	b.
c.	c.

3. Why is it important to use other visual materials such as maps, charts, filmstrips, and films in conjunction with the globe?

4. Indicate the size globe you would recommend for group instruction in a classroom with thirty pupils.

Another development in globe study is the use of the relief globe. This new type globe with a raised surface is provided without labels or symbols. The students can use tempera paints to develop their own coloring. This type of globe provides motivation and stimulation in many learning situations.

Weber Costello Co.

LEARNING ABOUT MAPS FROM GLOBES.

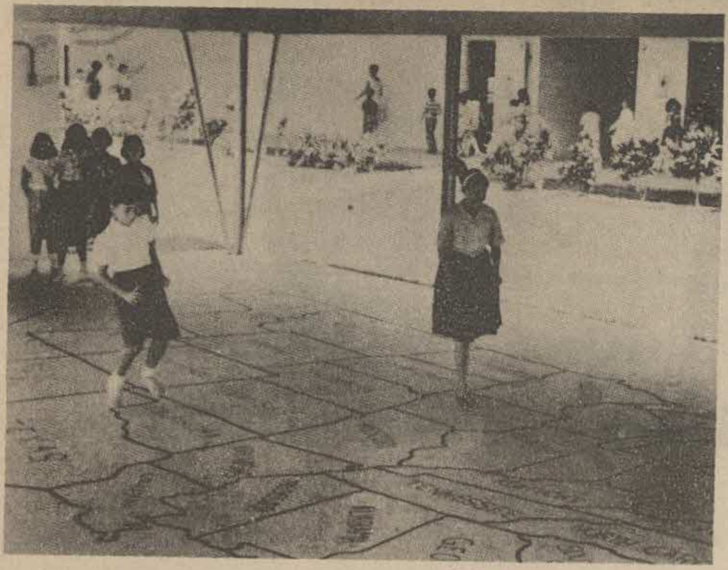
Slate Surface Globes

The slate-surfaced globe is available in several different forms, but the most popular type is the one with continents and oceans indicated. This type of globe is used primarily for student projects. A variety of projects such as location of different countries, rivers, important cities, elevation, and rainfall can be drawn on the slate globe. They are easily cleaned for the next project with an eraser or damp cloth.

5. To understand better the teaching relationship between globes and simplified maps, careful study and comparisons should be made. Using a beginner's simplified globe and world simplified regional map, consider how you would teach a class of elementary children how to understand flat maps. Take into consideration such things as color, shape, and relative size of both the globe and map. Outline your conclusions.

Illinois State Normal University

USING THE SLATE SURFACED GLOBE.



MAP GAMES INTEREST CHILDREN.

Dade County Schools, Florida

Maps

Nearly every school in the United States has maps available for instruction. Most schools, however, do not have good maps, or maps adequate to meet the needs of the jet age in which we live. Cartographers are providing the maps necessary to teach in this jet-space age. Schools should make these new tools available, and teachers should learn the methods of teaching map-reading skills.

"Most teachers agree that many children have never learned map-reading skills. When a map is placed before a student, we must not assume any understanding of its symbols or any ability to read its message. The approach to the development of map-reading skill must come step by step, just as the reading of words and sentences is taught." [1]

Almost all maps can be classified into one of three types: The reference map, the special purpose map and the display map. Reference maps contain almost as many features as will fit in the space. They present a visual encyclopaedia of places. The special purpose maps are clear and concise. They convey understanding regarding such things as population growth, climate, nationalities, and economic activity. Such maps may be used separately or in groups to compare the distribution of one feature with the distribution of another. The third type of map is the display map. It is a compromise between the reference and special maps. Many of the general classroom-type wall maps are of this type.

In teaching with maps, it must be remembered that a map results from a "projection" of the earth's surface onto a flat surface. All map projections, no matter which of the many projections used, are inaccurate in one or more of its representations of the earth. Some projections of maps show variation in scale, some show lateral distortion, others may show distortion of shape and size, or perhaps distortion at the equator. Students must know the meaning of map symbols and be able to translate such symbols into meaningful experience. If they don't, they will never be able to read maps. Different colors, used for different purposes on maps, must be carefully presented so the child will not get the impression that certain states are purple and other states or countries are green, for instance.

A series of charts titled, Map Symbols Pictured, has a unique method of presenting basic map symbols and what they represent with accompanying photographs. By means of the charts, the pupils learn to associate map symbols in progressive degrees of difficulty with actual experiences of earth features.[2]

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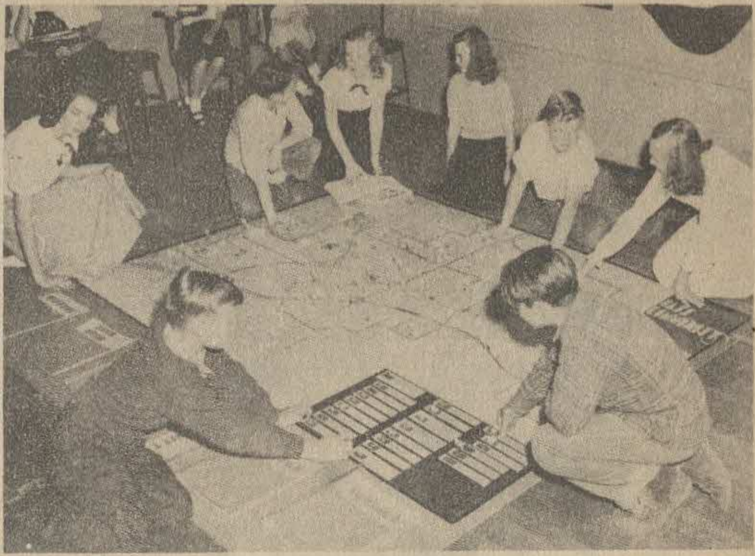
[1] Preston E. James, "Developments in the Field of Geography and Their Implications for the Geography Curriculum," *Journal of Geography, A Magazine for Schools,* 1947.

[2] Zoe A. Thralls, *Map Symbols Pictured* (Chicago: A. J. Nystrom & Co., 1952).

STUDENTS CONSTRUCT A MAP OF THE COMMUNITY.



Atlanta Public Schools

Students must understand the difference between such maps as the political map, the political-physical map, precipitation maps, soil and vegetation maps. They should also be able to use different types of maps to gain desired information and to transfer this information from one map to another.

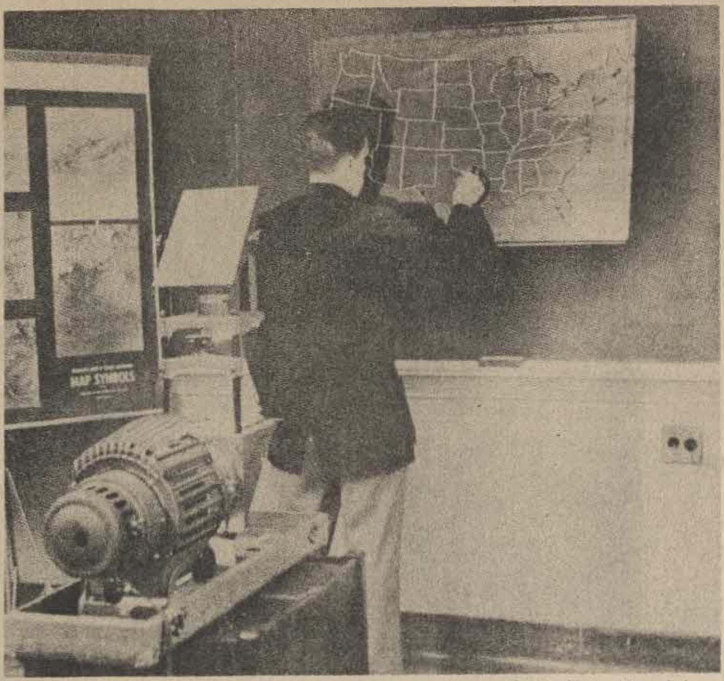
For teaching the physical features of a country or area, the three-dimensional relief map is very helpful. Students using this type of map will better understand the roughness of mountain areas, or the smoothness of the plains regions, and be able to transfer these concepts to the regular physical map where color is used to designate land elevations. The sand-table will help children understand maps better by showing the physical characteristics of local areas.

6. Name three different types of map projections and describe the specific purpose of each projection.

	Type	*Purpose*
a.		
b.		
c.		

Projected Maps

Projected maps are proving popular in classrooms as a supplement to the larger wall maps. Maps may be in the form of 3¼″ x 4″ or 2″ x 2″ lantern slides, filmstrips, opaque projections, or the larger transparencies on the overhead projector. The opaque projection of maps is probably the most popular. Students enjoy collecting maps and chart materials from magazines and other publications and bringing them to class where they can be shown with the opaque projector. Projects of this nature have a tendency to motivate the children to want to know more about things they discover. Maps in different forms may be projected directly onto the chalkboard for copying outlines and for certain fill-in problems. Some teachers prefer to project maps onto large sheets of wrapping paper and have students make enlarged maps for certain study projects. By the use of colored chalk on the chalkboard, or crayon on paper, effective colored maps may be made from the projected map.



State University of Iowa

PROJECTING A MAP ONTO THE CHALKBOARD BY USE OF AN OVERHEAD SLIDE PROJECTOR.

Every teacher should have a good basic understanding of globes and maps and the methods of presenting them in various teaching situations. Teachers should also have certain standards for selecting good maps. The World Federation of Educational Associations has been working on map standards for a number of years and reports its progress in the *Thirty-Second Yearbook* of the National Society for the Study of Education.[3]

Map rails or display rails, usually located above the chalkboard, are extremely useful in the classroom. They serve as a means of displaying the map or maps being studied. Such rails can also be used for displaying charts, graphs, and other large graphic materials.

7. For what specific purpose would you use chalkboard-type, wall outline maps?

8. Indicate four important concepts that pupils must understand in first learning to read maps.

a.

b.

c.

d.

---

[3] A. G. Eldridge, et al., "Maps and Map Standards," *Thirty-Second Yearbook* of the National Society for the Study of Education, pp. 394–405, 1933.

9. Preview several motion picture films listed in the bibliography relating to maps and describe how they might be used to improve map and globe study.

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"Global Concept in Maps," 11 min., sd., b&w or color, Coronet Films, 1948.

"Impossible Map," 10 min., sd., color, National Film Board of Canada, 1948.
"Introduction to Map Projection," 18 min., sd., b&w, United World Films, Inc., 1950.
"Maps and Their Meaning," 14 min., sd., color, Acadamy Films, Inc., 1950.
"Maps and Their Uses," 11 min., sd., b&w or color, Coronet Films, 1951.
"Maps Are Fun," 11 min., sd., b&w or color, Coronet Films, 1946.
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"Our World," 18 min., sd., color, International Film Bureau, 1957.
"Reading Maps," 22 min., sd., b&w, or color, Encyclopaedia Britannica Films, 1955.
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"How a Weather Map Is Made," 62 frames, si., b&w, National Film Board of Canada, New York.
"How to Make Relief Maps," 15 frames, si., color, Lindhorst, Frank, 1953.
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"Introduction to the Globe," series of five filmstrips, Jam Handy Organization, 1953.
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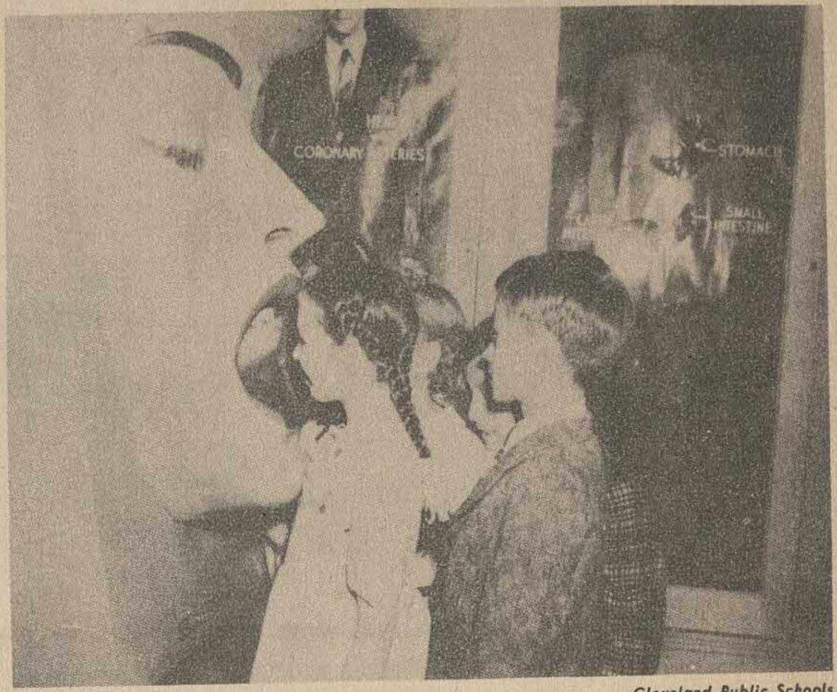


Cleveland Public Schools

10

DEMONSTRATION MATERIALS AND TECHNIQUES

MANY TYPES of demonstration materials—objects, specimens, models, mock-ups, electric boards and display boards—are familiar to the experienced teacher. A planned program for the selection, procurement, and use of these materials will bring greater interest and participation into many classrooms.

Demonstration materials bring actual *things* into the classroom where children can see, feel, and investigate them. From the time children learn to walk, they are inquisitive and want to investigate the world around them. If the classroom is made into a laboratory where all types of materials are available to the student and teacher, more learning will take place. Demonstration materials will help give meaning to the printed word and provide a better environment for learning.

Objects

An object can be defined as a genuine, actual-sized example. Many schools now provide storage space for objects of all kinds, so they will be available when needed for various units of study. Children enjoy bringing objects to school to show to their classmates. People who have traveled in other lands often are glad to come to the school to show and talk about things they have brought back from far-off places. Industries often produce study sets of objects they manufacture and make them available at

San Diego City Schools

COMPARING WORD DESCRIPTIONS WITH OBJECTS.

low cost to schools. Although these real objects are no longer in their natural setting, they lend tangible experience to the study of unfamiliar areas of life. Objects to be of value to the student, should not be stored in locked glass cases. Many modern classrooms provide space for the effective display of objects and other demonstration materials. Such display areas prevent damage to valuable instructional materials and at the same time give the student an opportunity to examine and study them.

1. Look over several directories of free and inexpensive materials; then list three sources of objects, available from industries, which would be helpful in your own subject field. (See bibliography for this chapter.)

a.

b.

c.

2. List ten objects you could use in your own teaching.

a.

b.

c.

d.

e.

f.

g.

h.

i.

j.

State University of Iowa

A SPECIMEN—PART OF AN OBJECT.

Specimens

Specimens are similar to objects but are usually considered part of an object. Items, such as rocks, are called specimens since they are only part of a larger rock. Dissected parts of animals would be considered specimens. Other specimens would include pieces of the bark of a tree, cross sections of wood or seeds, buds of flowers, and other materials of this nature. Specimens play an important part in the instructional program of many courses. They should be selected, procured and used in the same way as other classroom tools.

3. In your own subject field or grade level, list two specimens or collections of specimens that would make a major contribution to instruction.

a.

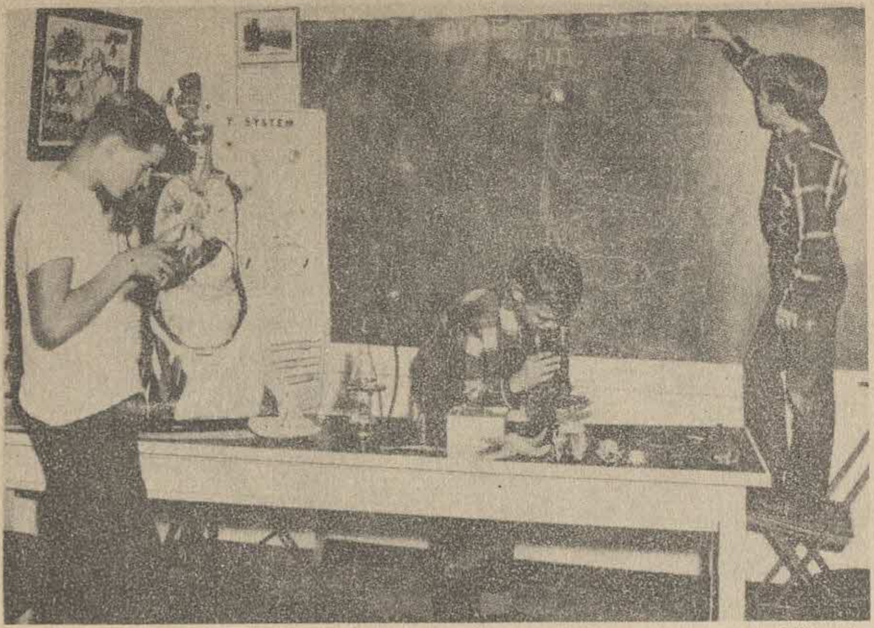
b.

Models

A model is a recognizable, scale representation of an object. It may be larger or smaller than the real object. It is only natural to assume that if the original object is quite large then the classroom model, to be effective, will be smaller, and if the object is small, the model must be larger.

Models are of several different types. The *scale model,* for such things as cars, tractors, and airplanes, is used to show the exterior form and shape of the original.

Working models have certain parts that move to show how these essential parts operate. For instance, the working model of a fluid drive gear system of an automobile would probably show only the essential moving parts and not all of the details of the original.



California State Department of Education

CORRELATING THE STUDY OF MODELS WITH THE CHALKBOARD.

The *sectional type model* is constructed in such a way that it can be dismantled to show inner construction or detail. The sectional model is sometimes called the dissectable model, since it can be taken apart. Most commercially produced anatomical and biological models are of the dissectable type.

Good models are expensive; however, less expensive models can often be produced in the industrial arts department of the school. Some large school systems have well-organized programs whereby students in the industrial arts courses produce models for distribution through the audio-visual center. Other school systems maintain complete model shops, with professional staff members, for the production of models needed in the school's educational program.

All models should be adequately labeled. The label should provide key information and be located so as not to distract from the model.

Good storage space should be provided for models so they can be kept in top condition. Sometimes they are stored in the classrooms or housed in the audio-visual center where they can be distributed to other schools. The requirements of the individual instructor and the importance of the model to specific courses will determine the use and place it will be stored.

4. List two or more sources of commercially-produced models that would be of value in your teaching:

a.

b.

c.

Atlanta Board of Education

USING A MOCK-UP OF A SLIDE RULE.

5. Draw the plans of a simple model which might be built in the industrial arts shops of a school, and which would make a definite contribution to teaching in your subject field. (Indicate the scale of the proposed model.)

Mock-ups

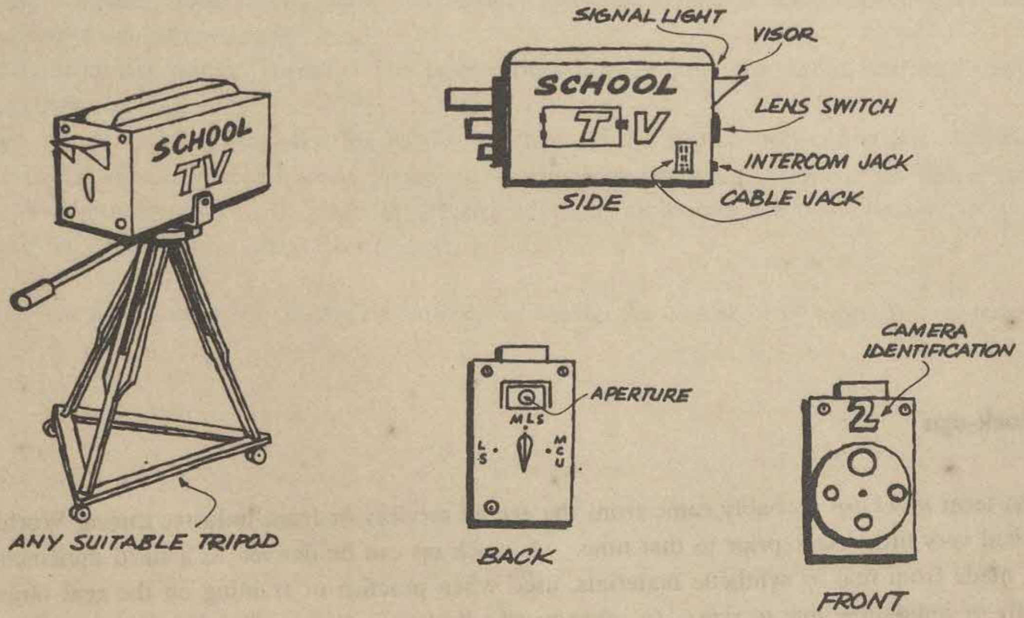
The term *mock-up* probably came from the armed services or from industry during World War II; at least it had very little usage prior to that time. A mock-up can be defined as a third dimensional working replica, made from real or synthetic materials, used when practice or training on the real object would be too costly or impossible due to size. In other words, it is an imitation of the real thing. Mock-ups have been used extensively by industry and the armed services as training devices for certain types of specialized equipment. It was impossible, in many cases, to provide a complete airplane to teach men how to repair or maintain the wiring system, so a mock-up was built using actual and synthetic parts. The mock-up provided an imitation of the real thing, and men could be trained to handle wiring problems when assigned to such duty. In other instances, complete engine room mock-ups were constructed to simulate the controls and operating phases of ships. These mock-ups gave trainees actual experience in the operation of complex equipment.

Although not always called by that name, mock-ups have been used in education for years. Physics teachers have used different forms of display boards ("bread boards") to explain electrical wiring and mechanical problems. A radio display board on which tubes and various other parts were attached has been used to teach the construction and operation of a radio. Experience gained in the armed services has shown many teachers how to improve other courses by using mock-ups. Teachers in technical schools have found especially wide application for mock-ups and different forms of display boards and electric boards.

The distinction between a mock-up and a display board is that a display board might show only one phase of an operation, while the mock-up usually simulates the complete operation. For instance, in the airplane wiring system mentioned above, a display board might be built to show just the switch controls, while a mock-up would probably show the entire wiring and control system.

Mock-ups can be used at all grade levels, since children of all ages enjoy imitating adult activities. Even in the lower grades, mock-ups are often built to simulate fire stations, farms, stores. The building of such mock-ups provides children with a genuine learning experience.

TV CAMERA MOCK-UP FOR CLASSROOM TEACHING PURPOSES



6. Draw the plans for a simple mock-up that you could use in your own teaching.

7. Name two types of display boards that would be of value in your teaching.

a.

b.

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Atlanta Board of Education

11

EXHIBITS AND DISPLAYS INCLUDING MUSEUMS

EXHIBITS AND DISPLAYS are methods by which we can explain visually things we have read or talked about. While some exhibits and displays, such as those in museums and trade shows, are very costly, teachers and students can produce their own at very little expense. By planning and building exhibits and displays, children learn to summarize their research, develop relationships, and improve their ability to tell others of their experiences. Those exhibits and displays which contain real things, in addition, present to the viewer a concrete visualization of a concept or principle.

Exhibits and Displays

Educational exhibits and displays are basically the same. They are a careful arrangement of three-dimensional materials designed to inform the observer about a subject of educational significance.

The *diorama* is a special type of exhibit technique which presents to the viewer a three-dimensional effect. Pictures or models are arranged in the foreground, while the rear of the exhibit, which is usually curved, is painted with a background scene. Small dioramas may be constructed by students for classroom use. In museums, life-size dioramas are often constructed to display animals in their natural habitat.

Student-made exhibits may be placed in classrooms, in the school corridor or lobby, in a store window, or in any space specifically designed

Parma Public Schools, Ohio

PORTABLE MUSEUM EXHIBITS ARE USED IN MANY SCHOOLS.

for special occasions. Wherever the exhibit or display is located, it is usually designed to serve two purposes—first as a creative learning experience for students, second as a method of imparting information concerning a process or an idea.

Among the educational purposes for building displays as a creative learning experience for children are the following:

A. Promote the desire to share experience.
B. Develop the ability of working together.
C. Provide for individual creative activity.
D. Develop skill in observation.

Those dealing with the display itself are stated by Marjory East[1] as follows:
E. Concentrate interest and attention.
F. Show the basic structure of an idea.
G. Explain abstract ideas by relating them to concrete things.
H. Bring scattered ideas together to form new concepts.
I. Turn ideas into words.

1. Study the picture of the exhibit on this page.
    a. Describe what you believe to be the educational purposes of this exhibit.

---

[1] East, Marjory, *Display for Learning*, p. 12. New York: The Dryden Press, Inc., 1952.

b. What part should the teacher have played in the construction of this exhibit?

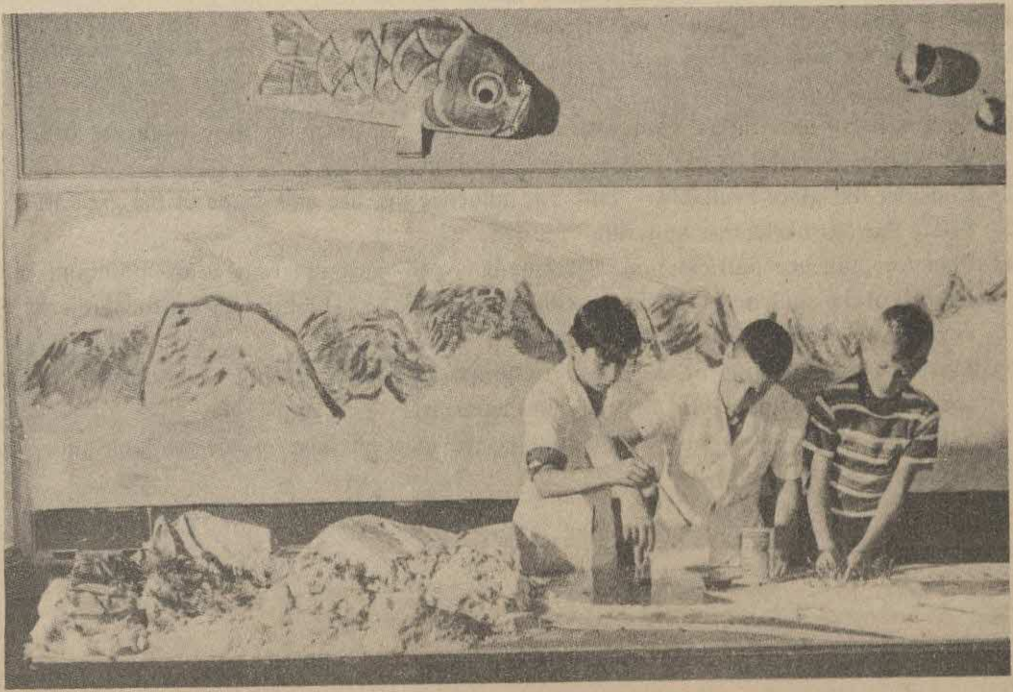
c. How could this exhibit be most effectively utilized to enhance student learning?

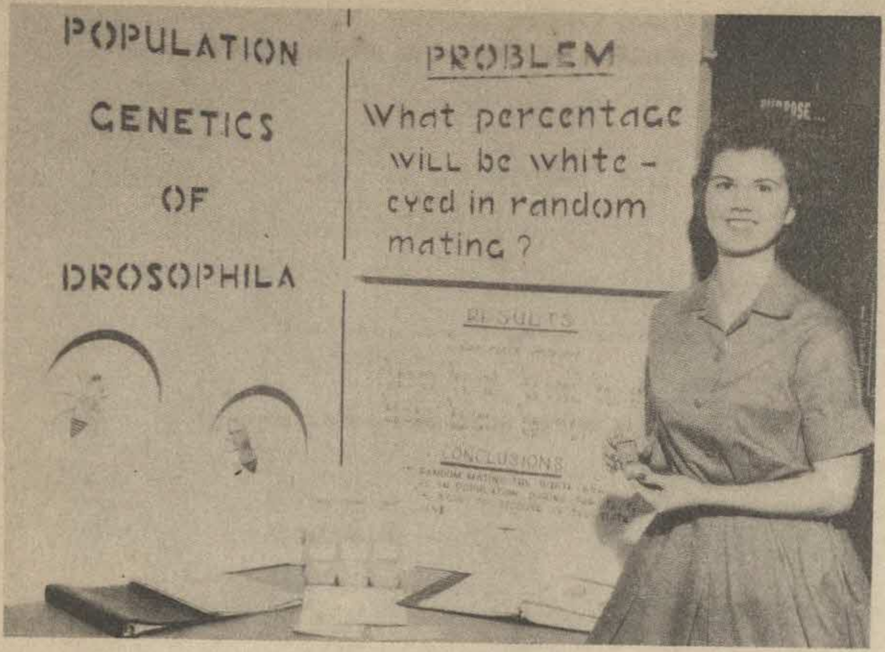
The preparation and use of the exhibit and display in schools have been increasing steadily over the past three decades. Pupils and teachers often prepare displays for school openhouses to show parents the types of activities the class has been doing. Science and Hobby Fairs use exhibits and displays for demonstrating the curricular and extracurricular activities of students.

In the classroom, students often construct exhibits and displays to visualize oral reports or to summarize the findings of their research.

STUDENTS CONSTRUCTING AN EDUCATIONAL EXHIBIT.

California State Department of Education





PORTABLE DISPLAYS OF THIS TYPE BRING NEW INTEREST INTO THE CLASSROOM.

Atlanta Public Schools

Preparing an Exhibit or Display

It is important to remember that exhibit technique is but one of the tools of modern communication. It should be used only when it will assist in clarifying concepts or ideas in the teaching-learning situation or foster and develop desirable student abilities and attitudes.

In preparing an effective educational exhibit or display the following factors must be considered:

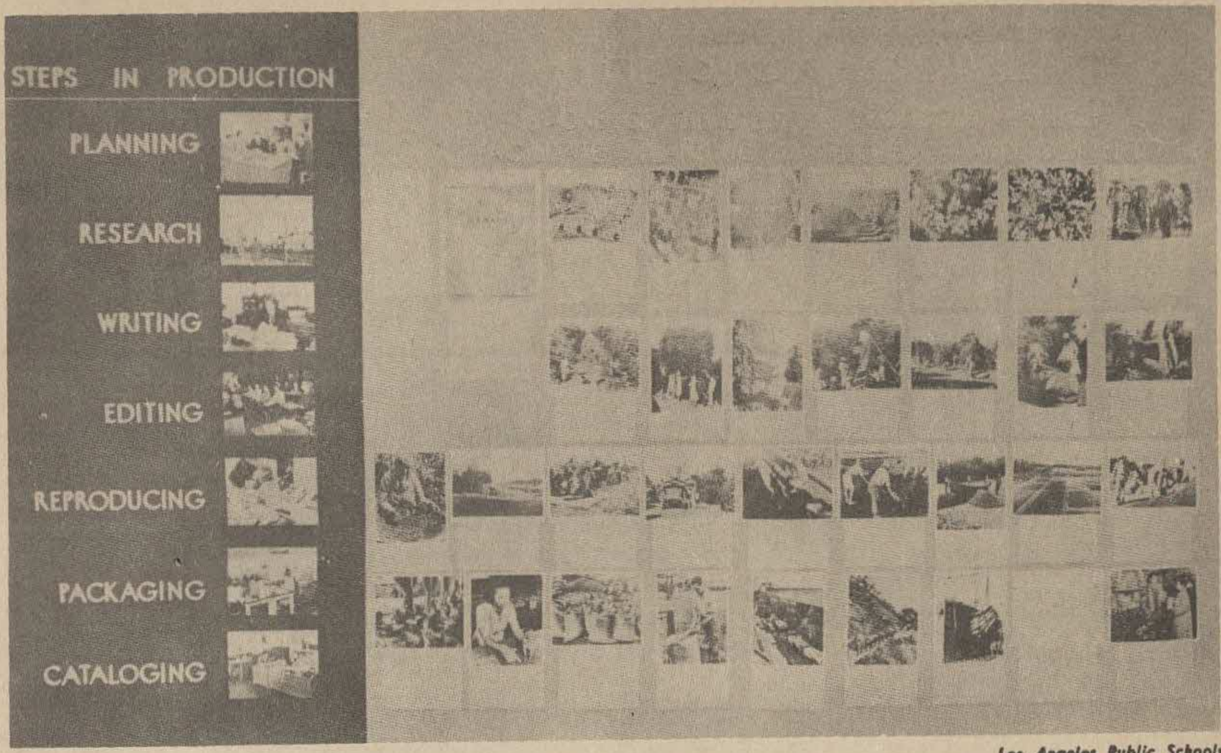
A. Define Purposes: Consider the audience, their needs, and interests. Be sure you can truthfully answer the following questions:

- (1) What subject will it cover?
- (2) Why is the exhibit being constructed?
- (3) What type of an exhibit would be most effective?
- (4) What educational objectives will it foster?
- (5) What is the audience expected to do, think, and learn?

B. Make preliminary plans:

- (1) Start with an idea rather than with material. If the purposes have been carefully considered, the type of material to use will become apparent.
- (2) Consider the space available. This will influence the size and shape of the exhibit.
- (3) Select the most effective material.
- (4) Plan for audience participation. Remember, you must not only draw attention, but hold the interest of the audience. When possible, build into the exhibit things for the audience to do, such as pull a lever, lift a flap, or turn a knob.
- (5) Make a rough drawing or sketch of the proposed exhibit, keeping in mind the basic factors of space size and shape, color, lighting, and lettering.

  Systematic planning at this point will make the most effective use of available time, money, and material.



Los Angeles Public Schools

DEVELOPING A STORY BOARD.

C. Translate the plan into action:
  (1) Procure all necessary objects and materials.
  (2) Provide, wherever possible, for student participation in the planning and production.
  (3) Construct the exhibit or display.

2. Suppose the principal of your school has told you that you are to be responsible for developing a display for the exhibit case in the front lobby of your school next week. The case is six feet long, four feet high, and two feet deep. In the space below, indicate how you would proceed in the construction of your specific educational exhibit.

A. Subject:

B. Purposes:

3. Classroom exhibits are effective media for assisting the teaching-learning situation. Describe the type of exhibit you might construct in your own *classroom* for educational purposes.

Evaluating Exhibits and Displays

Evaluating an exhibit or display is determining whether or not it is effective. Resulting changes in the attitude or behavior of the viewer should be studied.

4. Below is a list of criteria useful in evaluating your own drawing of your proposed display for the school's exhibit case. (Check each item in the appropriate column.)

	Poor	Fair	Good	Excellent
a. Planned for certain people				
b. Accomplishes purposes				
c. Draws attention				
d. Arouses and holds interest				
e. Presents a pleasing appearance				
f. Makes effective use of color, line, and design				
g. Material is carefully chosen				
h. Material is appropriately used				
i. Captions or title signs are effectively used				
j. Uses explanatory materials effectively				
k. Provides for audience participation				
l. Promotes decision and action				

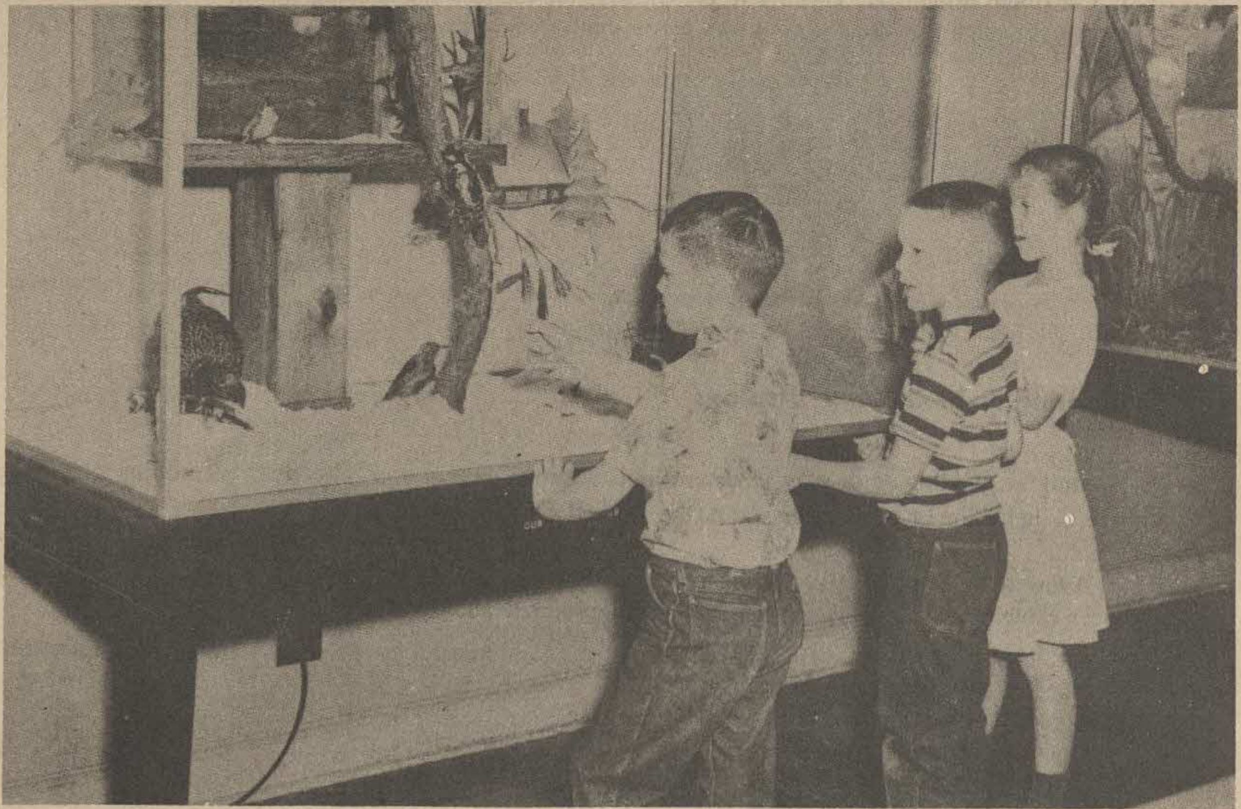
Museums

Museums often contain professional exhibits and displays, but they also perform a wide variety of services. In the past, people thought of museums as massive structures housing collections of miscellany, displayed in glass cases and carefully watched by uniformed guards. The basic theory and operation of the modern museum, however, does not conform to this concept. The museum of today is designed to serve both the youth and adults of the community and to work closely with the schools in enriching the curriculum.

To be of the greatest educational value, the objects in any museum must be available for students to touch, examine, investigate and study. Firsthand experience with "things" increases the student's desire to learn and makes real learning more permanent.

One of the greatest mistakes teachers make in taking classes to a museum, is to attempt to show students everything in the museum in one day. The wise teacher uses a museum to complement her teaching and selects wisely only the section or part of a collection about which her students are studying. Additional trips to the museum may be necessary to insure basic understandings and accurate student research.

There are two types of museums that must be considered as sources of materials and experiences. These are the public museum and the school museum.



Illinois State Normal University

MUSEUM EXHIBITS PROVIDE MOTIVATION AND BACKGROUND IN LEARNING.

Public Museums

There is an ever increasing number of museums in operation in this country. Some, such as the Field Museum in Chicago, are considered general museums in which can be found a wide variety of materials from prehistoric times to the present.

Others are very specialized and may contain collections from a particular country or specific period in history. Still others are devoted to the acquisition of materials from a particular field of knowledge such as aviation, geology, or atomic energy.

There are a few museums which cater only to children and contain materials and even a variety of live animals which may be checked out by the youngsters for limited periods.

Whatever the type or purpose of the museum may be, the basic functions are approximately the same. These are:

A. To display for the public, collections of interesting and instructional materials.

B. To provide traveling exhibits to schools on various educational subjects.

C. To provide free or nominal cost information about collections, in such form as bulletins, newsletters, colored slides, and sometimes, motion pictures.

D. To help correlate materials into the school curriculum upon request.

E. To conduct classes and field trips, and to give lectures for both children and adults in various cultural areas.

F. To train teachers in the effective utilization of museum tours and materials.

G. To conduct educational tours for school children through sections of the museum appropriate to the subject under study.

5. What is the name and location of the closest public museum to your school or college classroom?

a. What services does it render to schools in the area?

(1)

(2)

(3)

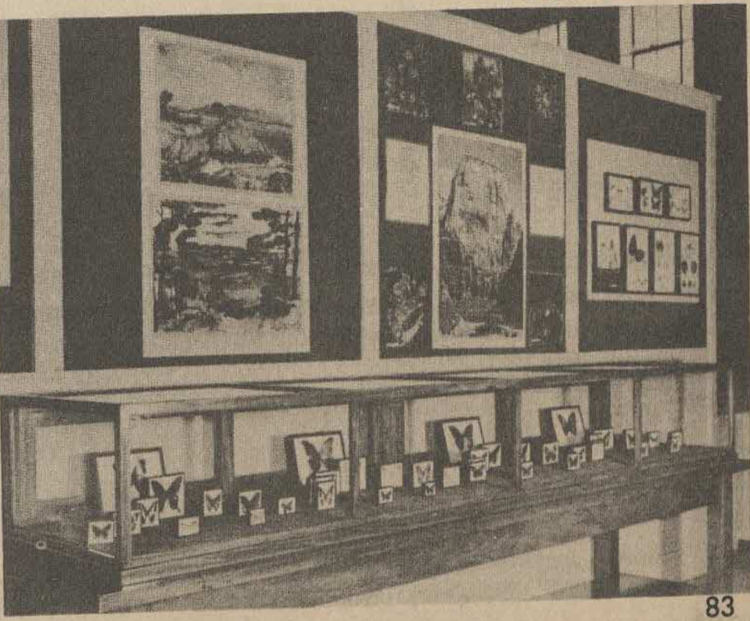
(4)

b. Describe how you would use the services of this museum in teaching your own subject matter.

School Museum

Local school museums have met with varying degrees of success. Their success or failure has depended, to a great extent, upon the purposes of the museum, the administrative support of the project, and the services it renders to the students of the school. Any school or school system can develop an interesting educational museum.

Los Angeles Public Schools



A SCHOOL MUSEUM DISPLAY MAKES STUDENTS WANT TO KNOW MORE ABOUT THE THINGS THEY SEE.

Several factors must be considered in the development and operation of a school museum. *First,* space must be provided where museum materials can be effectively and adequately housed. *Second,* the materials selected for the museum must be considered in terms of their contribution to the curriculum. A mere accumulation of odds and ends does not warrant the title, "educational materials." *Third,* all materials in the museum should be accessible for students to handle and examine. *Fourth,* the materials should be labeled and displayed in an interesting manner, arranged in groups, and portable, upon request, to any classroom in the school for closer examination and study.

6. If your school were to develop a museum, what suggestions would you make to correlate the type of materials to be procured, with your subject matter?

7. It has been said that "school museums are impracticable because of the limitations of material they are able to assemble." Do you agree or disagree? (Explain your point of view.)

Displays, exhibits and dioramas are methods by which students are motivated to learn or to share with others the results of their study, research or experimentations. Museums, whether designed for public or school use, are sources from which the teacher can obtain materials and assistance for the enrichment of their curriculum.

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Atlanta Public Schools

DRAMATIC EXPRESSION

12

DRAMATIC EXPRESSION has always played an integral part in the lives of all people regardless of their ethnic background. Dramatic expression has served as a substitute for real experiences, as a reconstruction of experiences, and as a way of interpreting social, political, or religious beliefs. There is no age limit, for young children constantly engage in unstructured play such as cowboys and Indians, cops and robbers, or space men and monsters, while adults continue their interest in dramatic expression by posing before a mirror, playing charades, or "putting on an act." Dramatic expression is a flexible medium because it can be adapted to almost any subject and audience depending upon the proposed purposes and the desired results.

Why Use Dramatic Expression In School?

Many of us can see the value and use of dramatic expression outside of school, but fail to see its relationship to learning in the classroom. Regardless of whether we believe we are teaching children or teaching subject matter, there are many inherent values in the use of dramatic expression in the classroom.

Some of the values of this medium for instructional uses are:

A. It develops:
  (1) Effective listening and looking skills
  (2) Feelings of security and confidence
  (3) Poise, diction, cooperation, and self-control
  (4) Understanding of subject content
  (5) Translation of subject content
  (6) Group cooperation

B. It promotes:
  (1) Creative ability
  (2) Developmental learning in language and the fine arts
  (3) Experimentation in the use of language, rhythm, and body
  (4) Self-expression and the use of imagination
  (5) Development of abilities, knowledges, and skills in subject matter areas
  (6) Application of previously learned knowledges

Dramatic expression provides many inherent values for the participant; however, the values of the observer are also important. The benefits derived by participants and observers make inclusion of dramatic expression in the curriculum well worth the effort.

1. What common values will both participants and observers receive?

2. What additional values will the participants receive?

3. What additional values will the observers receive?

Cleveland Public Schools

CHILDREN INTERPRETING A STORY THROUGH DRAMATIC EXPRESSION.

Style

There are two styles of dramatic expression which are widely used in schools. These are the informal dramas and the formal dramas.

Informal dramas are those types of activities in which individual participants are allowed to express themselves freely without prepared scripts or memorization of lines and actions.

Formal dramas include those activities which are more structured and where participants are required to portray "set" parts.

Types of Dramatic Expression

Dramatic expression can be categorized in two ways: First is style, the second is form. *Style* refers to the type of techniques used. *Form* refers to the method of presentation.

The selection of a particular style or form of dramatic expression to be used in a given situation is dependent upon the teaching objectives, the values to be derived by the performers, and the desired effect intended for the audience.

Either of these two styles may be used in developing dramatic expression depending upon the objectives, values to be derived and effects desired. For example:

A. Unstructured play
B. Role-playing
C. Socio- and psycho-drama
D. Acting out stories
E. Scroll-rolls
F. Puppets
G. Marionettes
H. Shadow plays
I. Pantomime
J. Simulated radio or T.V.
K. Tableaus
L. Pageants
M. Plays

A quick glance at the above listing makes us realize that some of the forms, such as unstructured play, role-playing, and the socio- or psycho-drama, may best be handled in the informal style. Others, such as acting out of stories, scroll-rolls, puppets, marionettes, shadow plays, and pantomimes, can be produced in either the informal or formal style. Still others, such as simulated radio-T.V., tableaus, pageants, and plays, are best presented in the formal style.

It is the prerogative of the teacher to select the form of dramatic expression and the style to be used which best fits the learning-teaching situation.

4. What style and form of dramatic expression would you use to develop a feeling of the "value of the individual?"

Style:

Form:

Why?

Unstructured Play

Younger children have a lack of inhibitions and derive great satisfaction from unstructured play. First, they play by themselves and can imagine that a stick is a horse, a cereal box is a car, or a mud ball is a fancy cookie. Later, children learn to play and share with others and add costumes to give realism to their imaginary play. Teachers often use unrestricted play not only as an outlet for creative expression but as a technique to observe the social, mental, and psychological development of youngsters.

Role-playing

Role-playing is the acting out of an assigned role. It can be used from the elementary grades through adult classes, and in a variety of subject matter areas. This form of dramatization is often used to summarize experiences or learned facts, or skills. Students who have returned from a trip to a supermarket may wish to "play" store and act out the roles of the people they saw. This can be done quite simply with only a few props or it may be done quite elaborately with counters, checkstands, and display cases made from cardboard boxes.

Socio- and Psycho-Drama

The socio-drama is an unrehearsed, unprepared student presentation dealing with some aspect of social relationships. The psycho-drama is also unrehearsed and unprepared, but usually deals with personal relationships and conflicts.

Both of these forms of dramatic expression are extremely valuable in developing understandings of how individuals must work and live together; however, care should be exercised in their use.

Acting Out Stories

Acting out stories is a form which has been used from the beginning of time. The style of the presentation, whether informal or formal, will depend upon a variety of things such as purposes, desired reactions, the time, money, talent, and materials available.

Stories can be acted out in many forms with the aid of pictures, flannelboards, puppets, marionettes, scroll-rolls, shadow boxes, or with only the fingers or a group of children.

Scroll-Rolls

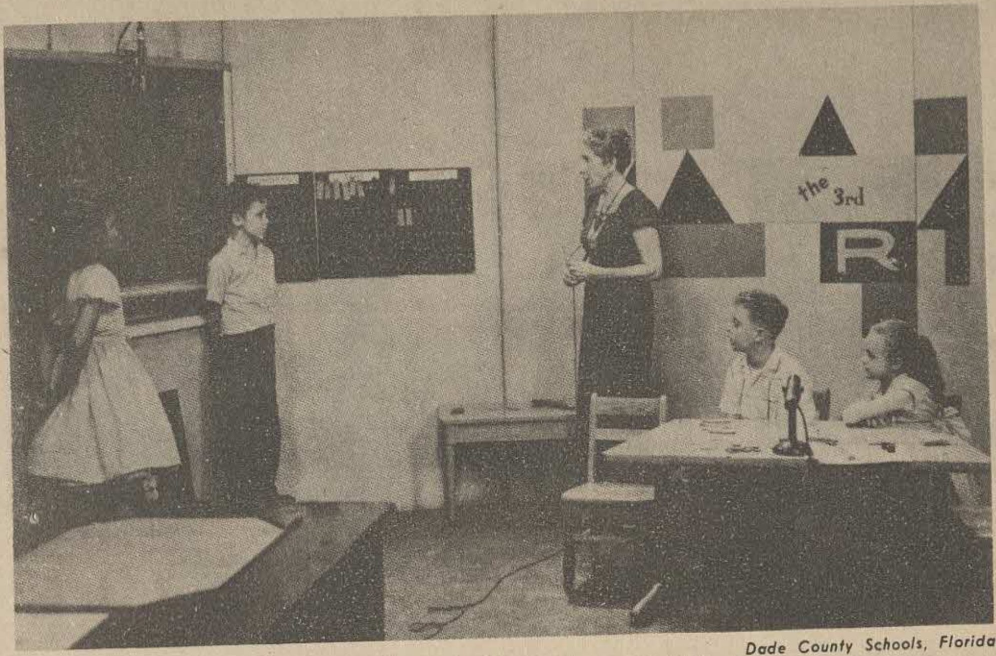
The scroll-roll is a technique of presenting a series of individual pictures drawn on a long piece of paper, one at a time. One student or a group of students can be assigned the task of preparing individual pictures which can later be pasted together and made into a scroll. The scroll can then be installed in a box into which a window has been cut and one picture can be advanced at a time, simulating a picture on a television screen.

Puppets and Marionettes

There are many types of puppets, including the finger puppet, the hand puppet, paper bag puppets, rod puppets, dolls, and marionettes. Puppets are usually operated with the hands from below a platform or stage while the marionettes are operated by strings from above.

Students enjoy the experience of making their own puppets. Younger children can construct them from paper sacks, stockings, or pâpier-maché while older students can work with more difficult materials such as plaster and wood.

Puppet shows can be simply the dramatization of a story or can be elaborately staged with musical background, sound effects, and lighting.



Dade County Schools, Florida

DRAMATIZING AN ARITHMETIC LESSON.

Shadow Plays

The shadow play entails the use of a translucent screen illuminated from the rear, on which the shadow of objects can be seen. As with puppets, shadow plays can be simple or very elaborate. Small shadow boxes can be constructed for use with finger or rod puppets while large shadow boxes may be built on the auditorium stage for use with standard props and live actors.

Simulated Radio or T.V.

In this era of mass communication, the simulated radio or T.V. has come into wide use. Students can prepare their own scripts, select background music and develop techniques for the use of sound effects.

Simulated T.V. programs can be combined with other forms such as the shadow play where the translucent screen becomes the picture tube; or the scroll-roll, where the script becomes the narration for the scroll drawings.

Simulated radio can make use of a variety of audio-visual equipment such as record players for background music and tape-recorded sound effects for added realism. The final production can then be recorded on tape or disc for evaluation or future use, or the entire program can be presented "live" or on tape, through the school's central sound system.

Simulated radio or television has application in most subject matter areas. The imaginative teacher can use this form of dramatic expression for a wide variety of purposes.

Pantomime

One of the oldest forms of dramatic expression is the pantomime, where the actors perform on the stage while the narration is given by an individual or group. The pantomime is often used to embellish choral speaking in English or in foreign languages.

Atlanta Public Schools

PARTICIPATING IN SUCH A PLAY WILL LONG BE REMEMBERED.

Tableau

Similar to the pantomime is the tableau, except that in this instance there is no dramatic acting on the stage. A tableau is generally a picture of some famous event or scene. As the narration is given, the actors are posed until the curtains are drawn or the lights dimmed. A second scene can then be prepared. Using a translucent screen behind which the scene can be set, the tableau can also be combined with the shadow play.

Pageant

The pageant is usually a large, colorful, and elaborate presentation of an event or period of history. An effective pageant makes use of the resources from all subject matter areas such as history, art, music, home economics, and physical education. Many schools have found the pageant a successful tool in showing relationships between various subject matter areas in the study of a particular period of history.

Play

The most formal type of dramatic expression is the play. Students must memorize lines and movement on stage. A great deal of time and effort is involved in the production of a successful play. However, the play is not limited to the drama department exclusively, for this form is equally applicable to such subjects as history, English, and foreign languages.

How to Use Dramatic Expression

The type of dramatic expression selected for use in the classroom will depend upon the outcomes desired. A clarification of purposes will determine, to a large extent, the method of approach and the amount of money, material, and energy needed for the project. It should be remembered that dramatic expression should not be considered as the end result, but only as a factor in the continuous learning experience of students.

Alert teachers are using dramatic expression to meet many and varied educational problems. One factor which is often overlooked is that enjoyment and learning do not end with the drawing of the curtain.

5. The psycho-drama and the socio-drama are being used more and more in schools to help students understand and develop tolerance, social graces, and school spirit. Describe briefly a situation for which you might make effective use of the psycho- or socio-drama.

6. Outline briefly the steps you would take in planning to use dramatic expression in your class.

7. Student participation, in the planning as well as the production of any type of dramatic expression, is an important aspect of student learning. How would you use students in the presentation of a puppet show?

State University of Iowa

STORY TELLING IS AN IMPORTANT PART OF THE STUDENT'S EXPERIENCE.

8. How would you evaluate the extent of student learning in question 7 ?

There are many purposes for using dramatic expression. Some of the most common ones are:

A. Introduction of a unit
B. Development of a unit
C. Interpretation
D. Correlations of bits of information
E. Identification of self with a situation
F. Dramatization of basic concepts
G. Transfer to real life situations
H. Motivation and arousing interest
I. Individual and group therapy
J. Follow-up or summarization of a unit

9. Select one suggested use from the preceding list. Describe briefly how you would develop a learning experience around that specific use; also indicate the type of dramatic expression you would use for the purpose.

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Oakland Public Schools, California

THE SCHOOL JOURNEY

13

TERMS SUCH AS FIELD TRIP, school study trip, or study of community resources are often used under the general heading, school journey.

A biology teacher may use a field trip to have the class study phases of nature found only in the woods, at the river, lake, or stream, or in the city park. The history teacher may wish his class to take a study trip to historical places in the vicinity. The civics teacher may wish to make a thorough study of the community resources of the village or city.

Some teachers and school administrators use the term school journey to indicate a longer journey that would take a class to distant points. Such trips may necessitate being away from the school for several days or longer. Other teachers speak of the school journey as any trip made within the community or vicinity. No matter which term is used, whether it be study trip, school journey, or field trip, the importance of children coming into contact with real situations cannot be overemphasized.

Why should a teacher try to explain the complex operations of a modern newspaper plant from texts and lectures when a modern newspaper plant is available in the vicinity? The rich experience of "I have seen" is worth many statements of "I have heard" or "I have been told." Why should the science teacher try to teach by the textbook methods of milking trout eggs and the spawning and care of fish, if a fish hatchery is in the immediate area? Of course, all teachers realize that time will not permit taking the class to study every phase of the different courses that are prescribed in the schools of today. However, careful planning and use of community resource materials will help make the important phases of learning a real experience.

Directory of Community Resources

Many schools have a directory of community resources that provide the classroom teacher with complete information concerning places that can be visited within the immediate vicinity. Such directories should give complete information to assist the teacher in selecting those resources that will offer the greatest learning experience. Information provided in many directories includes:

A. An index of places to visit and things to see
B. Appropriate grade levels
C. Subject matter areas
D. Persons to contact for arrangements, location, and distance
E. The type of transportation needed
F. The best time to visit
G. Special information the students should have before making the trip

A well-planned directory of community resources places the emphasis on "learning" and tends to discourage the teacher who uses school time for unnecessary trips. Such a directory will save the individual teacher many hours in collecting pertinent information. It also provides uniformity in curriculum planning. Such a directory should be developed in cooperation with school administrators, curriculum specialist, the audio-visual director, and teacher committees. When prepared in this manner, the directory of community resources becomes a part of the course of study.

1. List five (5) different methods students might use in collecting information for a community resource study.

a.

b.

c.

d.

e.

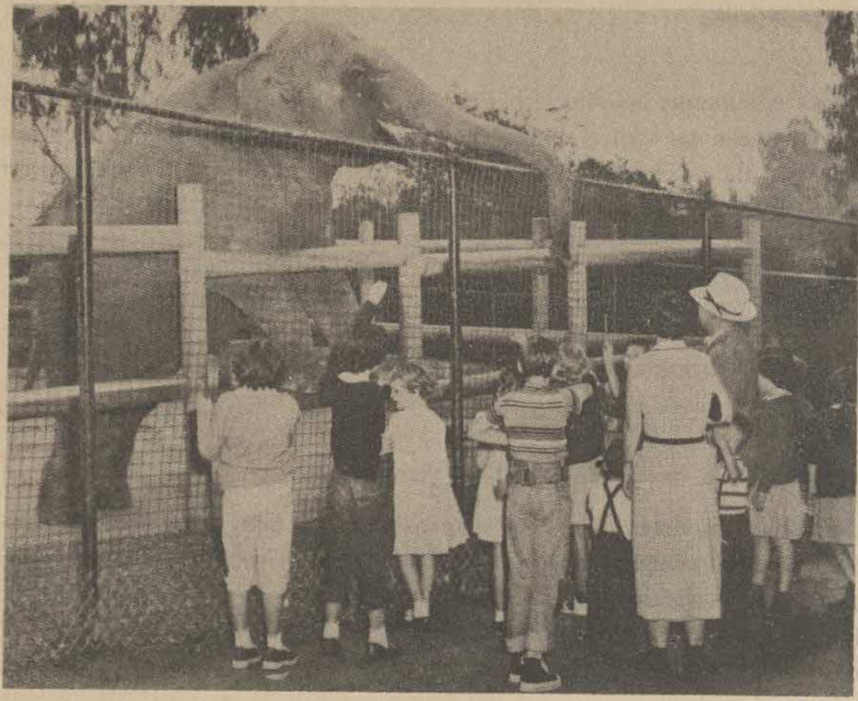
STATE INSTITUTE OF EDUCATION
Govt. of West Bengal

Planning the Trip

A well-planned school journey is a concrete learning experience that will be remembered for years. A poorly planned trip will result in confusion and waste valuable time.

A well-planned school journey should be arranged in advance. Such arrangements should include the following:

A. Have a specific instructional purpose.
B. Make a trip that will contribute to major areas of study and not to those that make only minor contributions.
C. Let the students assist in the planning and arranging of the trip. This is a valuable learning experience if properly supervised by the teacher.
D. List all important things to be studied. Such listings can be developed by student planning committees with the teacher.



A TRIP TO THE ZOO WILL PROVIDE MANY LEARNING EXPERIENCES FOR THIS CLASS.

Los Angeles City Schools

E. Take a preplanning trip prior to the class visit. Often the teacher and a small committee of students may wish to check on final arrangements.

F. Set up objectives before the trip. Projects and reading assignments will often help establish the objectives of the trip.

G. Inform parents of the proposed trip and obtain written permission for each child. Various regulations are in effect in different states concerning the transportation of children. It is suggested that each teacher check with the school principal or administrative office about such regulations. Parents should be notified if any special type of clothing will be needed.

H. Arrange for transportation through the regular school channels. Safety precautions must be impressed on the children and each child made to feel responsible. Standards of behavior must be planned and established. Courtesy should be discussed.

I. Plan for the types of materials students must take on the trip. Note paper, drawing paper, or other special materials will assist in making the visit an important educational experience.

J. Be sure that every student has an opportunity to observe the important phases of the study. The children's questions should be answered during the trip if possible. Adequate time should be allowed for students to make notes and sketches.

K. Provide time for follow-up study. Various committees may wish to use the bulletin board, others the chalkboard, and still others may wish to make scrapbooks or individual reports on the experiences of the trip. Other studies, such as creative writing, literature appreciation, art, music, or arithmetic can be correlated with the trip. A good teacher will use the experience gained on a school journey for many related learning projects.

L. Evaluate every school journey to see whether the objectives were fulfilled. Student as well as teacher evaluations should be made to get a true perspective of the trip's value. These evaluations will be of great assistance in planning future school journeys.

TRANSPORTATION IN THE OLD WEST COMES ALIVE FOR THIS CLASS.

Los Angeles City Schools

A Community Resource-Use Program

Most community resource programs not only include student trips to study many phases of community problems, but also bring into the classroom important people from the community to lecture about, discuss, and demonstrate other things that are happening in the community. The school journey or field trip might be inadvisable because of time; however, a person from an industry or an organization might be available to give demonstrations in the classroom. In this way, the children will be better acquainted with the products and the people of the communty. Local Chambers of Commerce often help teachers locate specialists from business or industry who are willing to come into the schools to assist in a resource program.

2. Plan a school journey for a class in your own subject matter field. Outline the complete plans including preplanning, conducting, and summarizing the trip. The following outline may be helpful.

   a. What are the specific objectives of the trip?
   b. What should the class learn?
   c. What preparation will be necessary?
   d. What information should the class be given to make this trip important to the unit being studied?
   e. What follow-up activities would you suggest to the students?

San Diego City Schools

LEARNING ABOUT COMMUNITY PROBLEMS.

Oakland Public Schools

COLLECTING MATERIALS FOR CLASS PROJECTS.

3. List in order of preference the five places to which you would recommend taking a class on a school journey, and indicate the specific objectives of each. Be sure to indicate city or area from which these journeys would start.

City or area: ______________________ State: ______________

	Place	*Objective*
a.		
b.		
c.		
d.		
e.		

4. Project: Form a committee, assemble information concerning community resources, and develop a directory for your local community.

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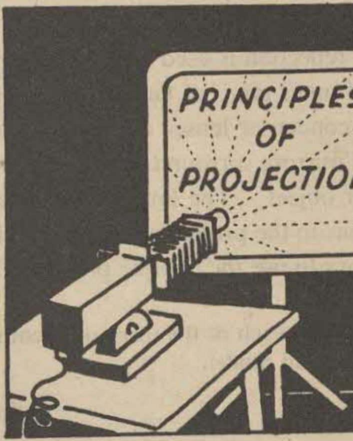
UNIT THREE

PROJECTED TEACHING MATERIALS



14

PRINCIPLES OF PROJECTION

MANY DIFFERENT KINDS of mechanical equipment can be used to project pictures. Teachers and administrators do not need to be mechanics or repairmen, but they should know some basic things about projection equipment. With a general knowledge about the equipment, they can make needed adjustments and minor repairs. Simple adjustments of the equipment will often yield greatly improved pictures on the screen or improvements in the sound.

There are three major projection systems: (1) direct, (2) indirect, and (3) reflected. The difference between these systems is the method by which the light is directed from the source through, or reflected from, the object being projected, to the screen.

Direct Projection

Direct projection is the most commonly used system. By this method, the light passes directly from the projection bulb, through the condenser lenses, through the material, through the objective lens, and onto the screen. A minimum of light is lost by the direct projection method.

Indirect Projection

Indirect projection is used for special purposes. Examples are the overhead 3¼ x 4 lantern-slide projector and the large 7 x 7 or 10 x 10 transparency projector. With an indirect light source and using mirrors, the projector can be used in the front of the room. The materials being projected are placed on a flat platform. Although in some instances there is a loss in the amount of light passing through an indirect projection system, as compared with a direct system, the loss is negligible. Most overhead projectors with the indirect system can be used in a well-lighted room. Many of the overhead projectors use a higher wattage projection bulb.

Reflected Projection

Projection by reflection is used only in the opaque projector. Opaque materials such as pictures, book pages, objects, and other types of flat or semiflat objects, can be projected by the reflected method. In the opaque projector, condenser lenses are not used to spread the light evenly over the object being projected; instead a series of mirrors surrounds the flat platen of the projector. The mirrors reflect all possible light onto the picture or object. The image is reflected in a large mirror immediately above the object through a large objective lens to the projection screen. The reflected projection system absorbs a great deal of light, making it mandatory to use the opaque projector in a darkened room for the most satisfactory projection.

1. Locate one of each of the three different systems of projection, direct, indirect, and reflected. Indicate below the make and model.

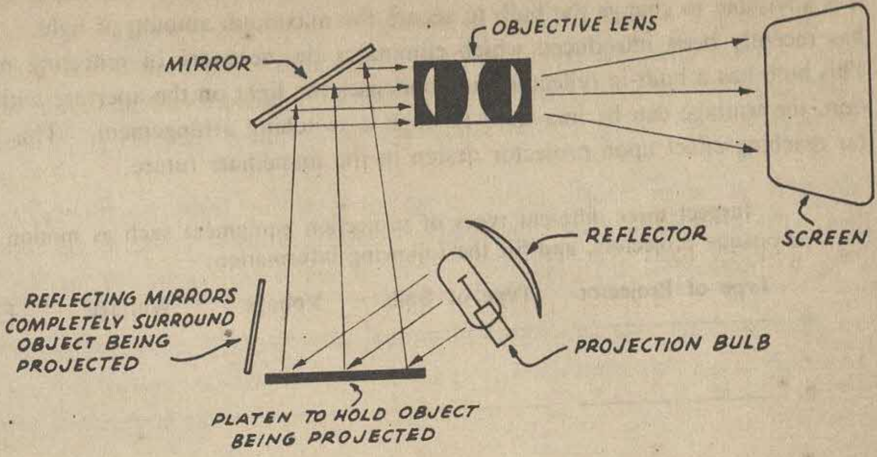
Type	*Make*	*Model*
a. Direct		
b. Indirect		
c. Reflected		

Projection Bulbs

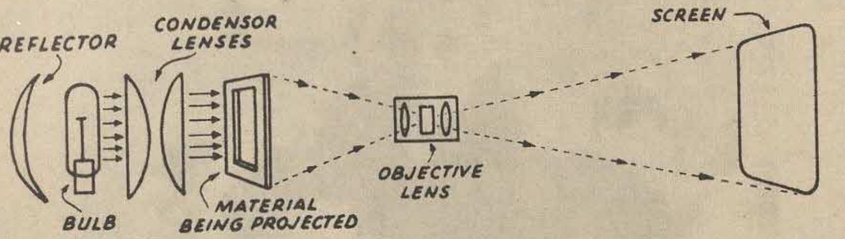
A wide variety of different size and wattage of bulbs is used in projection equipment. It is always advisable to have one or more extra projection bulbs on hand to fit each projector. Be sure to order replacement bulbs of the same voltage, wattage, and base type.

All modern projection instruments use a prefocus base type of bulb. Prefocus projection bulbs are available with several different types of bases. In every case when the bulb is locked into position the light filaments are aligned to give the maximum amount of light. Most projection bulbs are made to burn with the base down. To get the maximum burning hours from projection bulbs, they should not be tipped, while they are burning, beyond the normal amount allowed by the tilting device on the projector. Projectors should not be jarred while the bulb is hot. If the projector has a separate switch for the cooling fan, it is advisable to allow the fan to operate for about thirty seconds after the bulb has been turned off, to allow the bulb to cool. Proper cooling of the projection bulb prior to moving the projector will help keep the bulb from burning out prematurely.

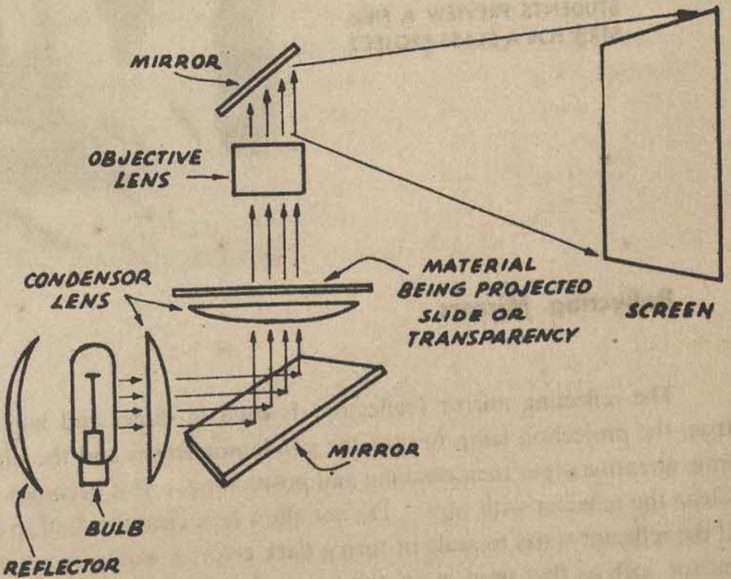
Most projection bulbs are rated by the manufacturer at twenty-five hours burning time. Some of the 1000 watt types for use in 16mm. motion picture projectors are rated at only ten burning hours. It is not advisable to use higher than usual wattage projection bulbs in equipment unless approved by the equipment manufacturer. Use of higher wattage projection bulbs will often result in burning or scorching slides, filmstrips, or motion picture film. Follow the instructions furnished by the manufacturer of the projector. In


OBJECTIVE LENS
MIRROR
SCREEN
REFLECTOR
REFLECTING MIRRORS COMPLETELY SURROUND OBJECT BEING PROJECTED
PROJECTION BULB
PLATEN TO HOLD OBJECT BEING PROJECTED

REFLECTED PROJECTION



DIRECT PROJECTION

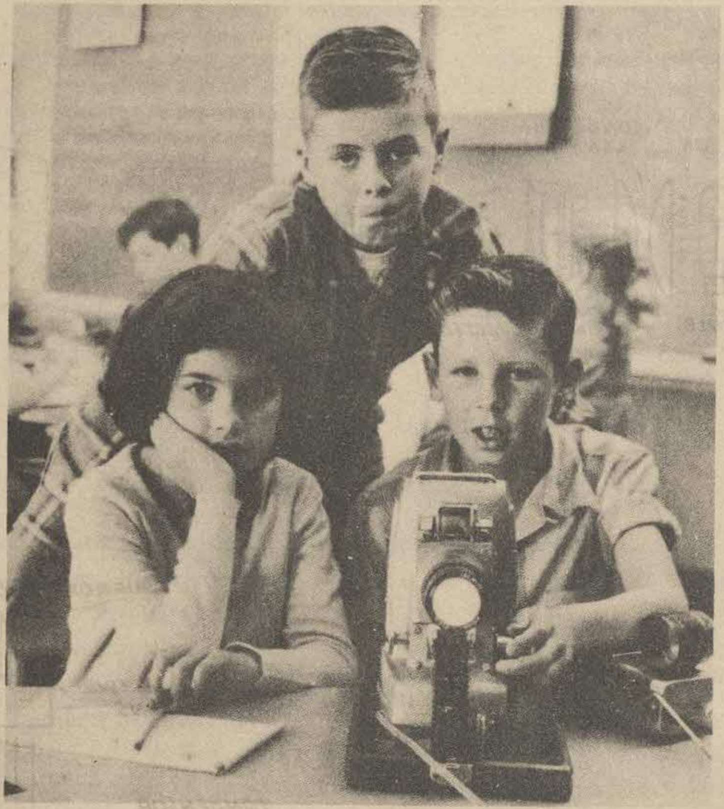


INDIRECT PROJECTION

some instances projection bulbs may develop a dark coating on the inside of the bulb. In such instances it is advisable to change the bulb to secure the maximum amount of light. A new type of projection bulb has recently been introduced which eliminates the necessity of reflecting mirrors and condensing lenses. This bulb has a built-in reflector and condenses the light on the aperture with great effectiveness. In addition, the wattage can be increased through a switching arrangement. This new development may have a far reaching effect upon projector design in the immediate future.

2. Inspect three different types of projection equipment such as motion picture, filmstrip, lantern slide, or opaque projectors, and list the following information:

	Type of Projector	Type of Bulb	Voltage	Wattage	Forced or Natural Ventilation
a.					
b.					
c.					



STUDENTS PREVIEW A FILMSTRIP FOR A CLASS PROJECT.

San Diego City Schools

Reflecting Mirrors

The reflecting mirror (reflector) is used in direct and indirect projection systems to reflect the light from the projection lamp toward the condensor lenses and the object being projected. The reflector needs little attention other than cleaning and positioning. If it becomes dirty, it will cause a loss of projected light. Clean the reflector with care. Do not allow lens cleaning fluid to get on the rear, silvered side of the mirror. If the reflector starts to scale or turn a dark color, it would be advisable to replace it, or in the case of a large mirror such as that used in an opaque projector, to have it resurfaced.

Lenses

Since all projectors use some form of lens, it is essential to know the purpose of these lenses. Although it is not important to know all the technical uses and terms regarding lenses, it is important to understand those terms and problems relating directly to improving and maintaining a good, clear picture on the screen.

Most projection equipment is originally equipped with good lenses, but often, after considerable use, the lenses are broken, improperly mounted, or are allowed to get out of alignment. As a result, a poor picture is projected on the screen. A brilliant picture on the screen is always desirable when projecting any type of material.

Most projectors, especially the lantern slide, filmstrip, and motion picture projectors, have two sets of lenses. The condensing lenses are located immediately in front of the projection bulb, and the objective or focusing lens is found at the front of the projector.

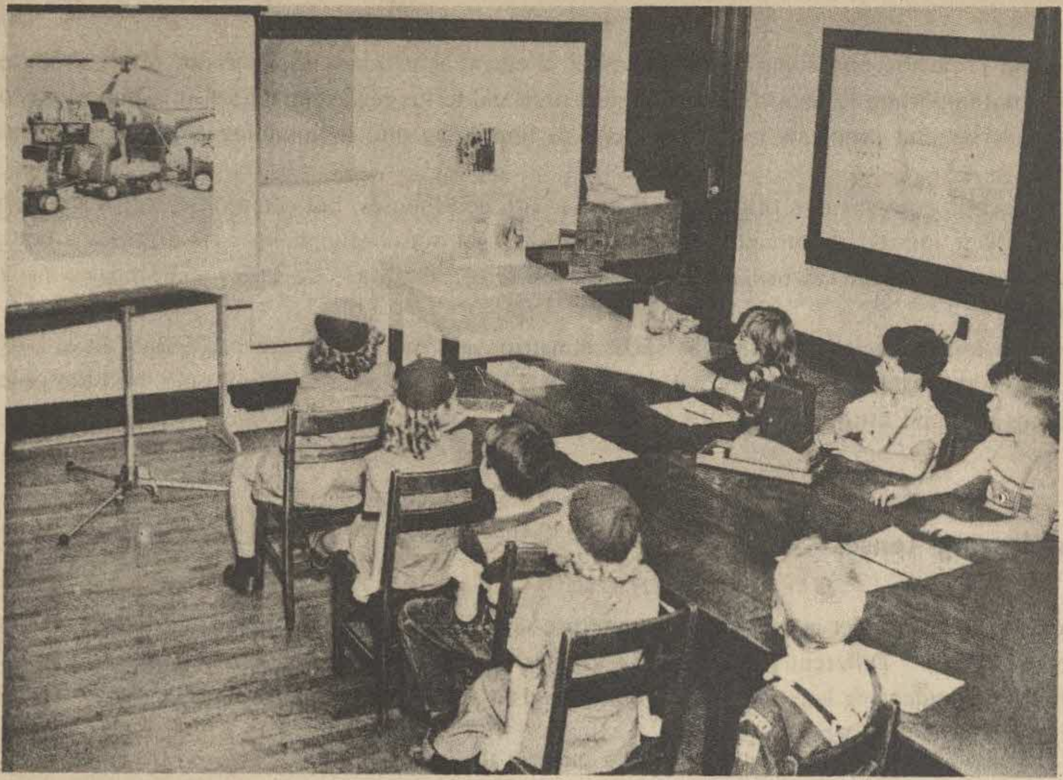
Condensing Lenses

Projectors that project a transparent image use condensing lenses to spread the light evenly over the object being shown. Different projectors use various combinations of condenser lenses to obtain the desired results. Condensing lenses are usually mounted in sets of two or more units.

3. Draw a diagram of a convex lens and indicate the light path.

4. Draw a diagram of a concave lens and indicate the light path.

Since the condenser lens is located near the projection bulb, it is necessarily subject to considerable heat, and often cracks or breaks. Although a cracked condenser lens can be used, it will often cause a streak on the projected picture or color lines on the screen. New lenses can be easily ordered from the manufacturer. In replacing condenser lenses, be sure to get them in the original position. If the different seg-



Los Angeles Public Schools

ELEMENTARY STUDENTS CAN OPERATE EQUIPMENT IF PROPERLY INSTRUCTED IN BASIC TECHNIQUES.

ments of the condenser lens system are not in correct position, they will not project the light evenly.

Some projectors are equipped with an additional glass disc called a heat filter, which is designed to cut down the intensity of the heat striking the film material. The heat filter does not appreciably decrease the amount of illumination striking the screen. If it is permanently removed from the projector, the film material may be damaged.

Condenser lenses need very little care, but should be kept clean. Dust and dirt on the condenser lenses will reduce the amount of light projected and result in dim images on the screen. To clean the condenser lenses:

A. Remove the lenses one at a time, noting the orientation of the different surfaces.
B. Clean with soft, lint-free cloth and lens cleaning fluid.
C. Return them to the proper position in the projector.

Objective Lenses

The objective lens is one of the most important parts of any projection equipment. Whether the projected picture is crystal clear or fuzzy and distorted depends, to a large extent, on the quality and condition of the objective lens. This is the lens that focuses the picture as it is projected onto the screen. Lenses of different focal length can be purchased for most projectors. The focal length of most lenses does not vary and cannot be changed, because it is predetermined by the way the lens has been ground and assembled. If a different sized picture is desired at any given distance from the projector to the screen, then another focal length lens must be installed. An objective lens of new design that has recently been placed on the market can be adjusted for various focal lengths. This new lens will no doubt be more widely used in the future, making it unnecessary to have several different focal length projection lenses for each projector. Most equipment manufacturers provide a chart giving the projected picture size obtained with objective lenses of various focal lengths.

Most objective lenses furnished on modern projection equipment are coated. A coated lens is treated with a special chemical that reduces reflection within the lens and allows more light to pass through the lens to the screeen. Manufacturers claim various percentages of light increase for their lenses, but it is safe to assume that most coated lenses are superior to the noncoated type. Coated lenses can be identified by their bluish-purple tint. Noncoated lenses appear clear "white."

A good objective lens is an expensive item and should be handled carefully and cleaned often. Dirt, dust, and fingerprints accumulate quickly on the front and back elements of the lens, and often cause distortion or loss of projected light. The objective lens can be cleaned quickly with lens cleaning fluid and soft, lint-free cloth or lens tissue. A hard, fibrous cloth may scratch or damage the lens surface. Alcohol should not be used as a lens cleaning fluid because it seeps between the elements in the lens, causing damage and discoloration.

5. Most motion picture projectors come equipped with a 2" objective projection lens. If a longer focal length lens of 3" or 4" is available, complete the following experiment: The 2" objective lens projected a picture ______ (size) at a distance of ______ feet, and the ______" lens projected a picture ______ (size) same distance.

6. List the most commonly used focal length objective lenses on the following equipment:

Equipment	*Lens Size*
a. 16mm. motion picture projector	______
b. filmstrip projector	______
c. opaque projector	______
d. 3¼ x 4 lantern slide projector	______

Screens

A good screen is essential for successful projected-picture viewing. Many different types of screens are available. Each has a specific purpose when used under certain conditions. Some screens are wide angle, some are narrow angle, and others are made for rear projection.

Many statements have been made regarding so-called "daylight screens" and screens that present good pictures in the fully lighted classroom. There are a few screens on the market that will give a fair picture under adverse conditions, and no doubt future developments in screen surfaces will give us better screens for use in the semi-lighted classroom. At present, the only satisfactory manner of obtaining a good projected picture with most equipment is to control the amount of light in the classroom.

Screens should be selected with great care, depending on the projection job, and should be tried in the rooms where they will be used.

The Beaded Screen

The beaded screen is probably the most commonly used type in the schools today, because it provides a better reflecting surface than most other kinds. This screen is covered with minute glass beads that serve

8mm and 16mm MOTION PICTURES

LENS FOCAL LENGTH		SCREEN SIZES								
		30 x40"	37" x50"	45" x60"	52" x70"	63" x84"	6' x8'	7' x9'	8' x10'	9' x12'
8mm	16mm	Approximate Distance—Projector to Screen								
	1"	9'	11'	13'	16'	19'	21'	24'	27'	32'
¾"	1½"	13'	17'	20'	23'	28'	32'	36'	40'	48'
1"	**2"**	**18'**	**22'**	**27'**	**31'**	**37'**	**43'**	**48'**	**53'**	**64'**
	2½"	22'	28'	35'	39'	47'	54'	61'	67'	81'
1½"	3"	27'	33'	40'	47'	56'	64'	72'	80'	96'
	4"	35'	44'	53'	61'	73'	84'	95'	105'	126'

NOTE! 1-inch lens is standard with most 8mm projectors. 2-inch lens is standard with most 16mm. 5-inch or 4-inch focal-length lens is standard with most 2x2 or 35mm filmslide projectors.

3¼"x4" LANTERN SLIDES

LENS FOCAL LENGTH	SCREEN SIZES								
	40" x40"	50" x50"	60" x60"	70" x70"	84" x84"	8' x8'	9' x9'	10' x10'	12' x12'
	Approximate Distance – Projector to Screen Horizontal or Vertical Projection								
6"	7'	8'	10'	12'	14'	16'	18'	20'	24'
8"	9'	11'	13'	15'	19'	21'	24'	24'	32'
10"	11'	14'	16'	19'	23'	27'	30'	33'	40'
12"	13'	17'	20'	23'	28'	32'	36'	40'	48'
15"	17'	21'	25'	29'	35'	40'	45'	50'	60'
18"	20'	25'	30'	35'	42'	48'	54'	60'	72'
20"	22'	28'	33'	39'	47'	53'	60'	67'	80'
22"	24'	31'	37'	43'	51'	59'	66'	73'	88'
24"	27'	33'	40'	46'	56'	64'	72'	80'	96'
28"	21'	39'	47'	54'	65'	75'	84'	93'	112'

STANDARD APERTURES

	WIDE	HIGH
8mm Movie Projector	.172"	.129"
16mm Movie Projector	.38"	.284"
35mm Sound Movie Projector	.825"	.6"
35mm Single Frame Slides	.9"	.68"
2x2 (Double 35mm) Slides	1.3"	.9"
2¼x2¼ Single Frame Slides	2.125"	2.125"
3¼x4 Lantern Slides	2.875"	3"

35mm Single Frame Slides and Film Strips

LENS FOCAL LENGTH	SCREEN SIZES								
	30" x40"	37" x50"	45" x60"	52" x70"	63 x84"	6' x8'	7' x9'	8' x10	9' x12'
	Approximate Distance Projector to Screen Horizontal Projection								
3"	11'	14'	17'	19'	23'	27'	30'	33'	40'
4"	15'	19'	22'	26'	31'	36'	40'	44'	53'
5"	**19'**	**23'**	**28'**	**32'**	**39'**	**44'**	**50'**	**56'**	**67'**
6"	22'	28'	33'	39'	47'	53'	60'	67'	80'
7"	26'	32'	39'	49'	55'	62'	70'	78'	93'

2"x2" (Double 35mm) Slides and Film Strips

LENS FOCAL LENGTH	SCREEN SIZES								
	40" x40"	50" x50"	60" x60"	70" x70"	84 x84	8' x8'	9' x9'	10' x10'	12' x12'
	Approximate Distance Projector to Screen Horizontal or Vertical Projection								
3"	7'	9'	11'	13'	16'	18'	20'	22'	27'
4"	10'	13'	15'	18'	21'	24'	27'	30'	36'
5"	**13'**	**16'**	**19'**	**22'**	**26'**	**30'**	**34'**	**38'**	**45'**
6"	15'	18'	22'	25'	30'	35'	39'	44'	52'
7"	17'	21'	26'	30'	36'	41'	46'	51'	61

2¼"x2¼" SLIDES

LENS FOCAL LENGTH	SCREEN SIZES								
	40" x40"	50" x50"	60" x60"	70" x70"	84" x84"	8' x8'	9' x9'	10' x10'	12' x12'
	Approximate Distance – Projector to Screen								
4 "	6'	8'	10'	11'	13'	15'	17'	19'	23'
5 "	8'	10'	12'	14'	17'	19'	21'	24'	28'
6 "	9'	12'	14'	16'	20'	23'	25'	28'	34'
7½"	12'	15'	18'	21'	25'	28'	32'	35'	42'

HOW TO FIND EXACT SCREEN SIZE

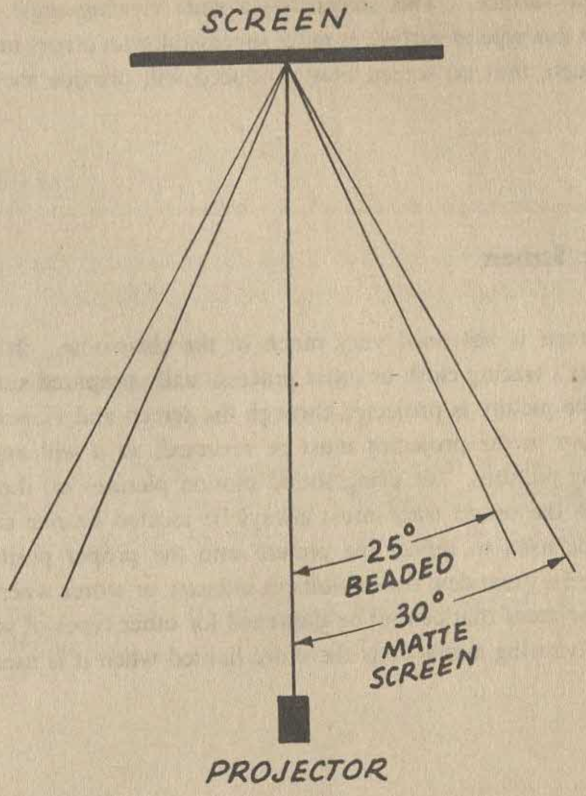
Aperture Width × Projection Throw ÷ Lens Focal Length = width of screen needed. For example: Aperture .38 (16mm movie projector) × 26 feet (projection throw . . . desired distance from screen) ÷ 2 (lens focal length) = 4.94 feet or approximately 58 + inches. Use a 45" x 60" screen.

A QUICK FORMULA

For projection distances not shown on the chart, use the 2 and 6 formula. For minimum viewing . . . 2 × screen width. For maximum viewing . . . 6 × screen width.

CHART FOR FIGURING SCREEN SIZE DESIRED FOR DIFFERENT FOCAL LENGTH LENSES
(Da-Lite Screen Company, Inc.)

as the reflecting surface for the projected picture. This type of screen is a narrow viewing-angle screen, and is particularly successful when used in a long, narrow room. It should not be used in a wide room where the students will be seated more than twenty-five degrees to the right or left of a line perpendicular to the center of the screen.



ANGLE OF SEATING FOR BEADED AND MATTE PROJECTION SCREENS.

The Matte Screen

The matte screen has a smooth, white surface. This type does not reflect as much light as the beaded screen, but it is recommended for use in a wide classroom. Those students who must be seated beyond a line twenty-five degrees to the right or left of a line perpendicular to the center of the screen will receive a better view of a projected picture on a matte screen than on a beaded screen. Thus the matte screen is often used in cases of poor viewing angle in the wider classrooms or auditoriums.

7. If your school was purchasing a filmstrip and 16mm. motion picture projector for use in classrooms 36′ long and 18′ wide, and you planned to use the projectors at the back of the classrooms, what objective lenses would you recommend be purchased for each projector if you were to use 63″ x 84″ screens?
   a. Recommended objective lens for the filmstrip projector ____________________
   b. Recommended objective lens for the motion picture projector ____________________

The Aluminum or Silver Screen

The aluminum, or so-called silver screen, was one of the first types used for projection. It has, of course, been greatly improved since the early days of motion pictures. Today, aluminum screens are recommended for the projection of stereo or three dimension pictures. In addition, they are highly recommended by some for the projection of color slides or films.

Lenticular Screens

A new development is called the "Lenticular screen." It can be recognized by the series of vertical ridges and valleys on the surface. This screen has a wide viewing-angle on either side of the projection axis. It is reported that this type of surface is more successful than others in rooms that cannot be darkened. It should be noted, though, that no screen now produced will provide the best picture without control of the exterior light.

The Translucent Screen

The translucent screen is not used very much in the classroom. It is made of a semi-transparent material, such as engineer's tracing cloth or other professionally prepared surfaces. The projector is placed behind the screen, and the picture is projected through the screen and viewed from the front. In using this type of screen, the picture in the projector must be reversed, so it will appear in the proper position for reading titles and viewing pictures. In using sound motion pictures on the translucent screen, the picture cannot be reversed, since the sound track must always be located on one side of the film. In this case, a series of mirrors must be used to reflect the picture into the proper position for reading on the screen. This type of screen is used a great deal for exhibits in industry or stores where pictures are part of a display. It is also used in rooms or areas that cannot be darkened for other types of screens. The translucent screen is usually small, and the viewing audience is therefore limited when it is used.

Plastic Screens

The plastic screen is of the rear-projection type, made in one piece, with an etched surface for projection. It is quite successful for viewing in a lighted room, although the size of the picture is somewhat restricted.

Screen Size

The correct screen size for any classroom is important. Most schools are now buying square screens instead of oblong ones. If a number of different projectors are to be used, such as opaque or 2 x 2 slide projectors, the square screen will be better. By pulling the screen only partially from its case, the square screen can also be used for motion pictures, filmstrips, and other projected materials that are oblong.

The ideal screen size for any classroom should be found by testing different sizes from the back of the room. Titles and other reading materials in projected pictures should be large enough to read from the last row of seats in the room. The "2–6" formula is quite often used in selecting screen sizes. This formula indicates that the first row of seats should be at a distance from the screen that is twice the screen's width; the maximum distance seats should be placed from the screen should not exceed six widths of the screen. Using this formula, a 36-foot classroom would need a six-foot screen as a minimum size.

8. If you were ordering a projection screen for a classroom 48 feet long and 18 feet wide, and were going to project the length of the room, what size screen would you recommend? ____________________
Would you recommend a matte white or a beaded screen? ____________________

9. If you were on a committee to select the proper screen to place in the school auditorium, what screen surface would you recommend for a room that was 75′ x 75′? Why? ____________

10. List two ways by which you can change the size of the image on the screen with any projector

a. ____________

b. ____________

Tripod or Wall-Type Screen

The two common kinds of cases for screens are the tripod and the wall case. The selection of the one needed in a certain school or room will depend on various factors, including the following:

A. Number of screens available in the building
B. Facilities for hanging the wall screens in the classrooms
C. Arrangements and darkening facilities of each classroom

In many modern schools wall type screens are being installed in each classroom. This type of installation makes it possible for teachers to use projected pictures whenever desired. In rooms where projected materials are used infrequently, it is suggested that tripod screens be used and moved from room to room as desired.

Prior to the purchase of screens, a school should make a complete survey of all needs of classrooms, auditorium, and other special laboratories.

Screen Position

The projection screen is usually located at the front of the classroom, but, in the modern classroom with movable seats, it might be advisable to locate the screen in some other position. In some instances, the screen might be placed against the outside light source, since this would minimize the extraneous reflected light which causes a poorly projected image. Thus screen placement may help present a better projected picture in a classroom without proper light control, but it will not take the place of proper darkening of the classroom for ideal projection. The height of the screen from the floor should be determined by its use. If the screen is to be used in a first or second grade room, it should be close to the floor for easy viewing. A screen should always be at an appropriate height to present a clear picture to the entire class with a minimum of strain on the students.

Screen selection, care, and placement are important to good projection, and should receive major consideration. Small screens may make the projected picture quite ineffective for use in the classroom. Old, dirty projection surfaces cut down the reflected light to such an extent that only a small percentage of the pupils see the picture properly.

Equipment Operation

It is highly recommended that every teacher and school administrator be able to operate the commonly used audio-visual equipment. Although many schools have student operator clubs, the teacher should know the mechanics of operation.

11. Use the Operator's Progress Chart and have your instructor check you when you have completed each step.

OPERATOR'S PROGRESS CHART

	Date	*Approved for License*
Sound Motion Picture Projector	....	....
Opaque Projector	....	....
Lantern Slide 3¼ × 4	....	....
2 × 2 Slide and Filmstrip Projector	....	....
Screens	....	....
Film Care and Inspection	....	....
Magnetic Recorder	....	....
Playback	....	....

Operations to Be Learned

Sound Motion Picture Projectors
(Two Different Makes)

Remove from cases and set up for operation ....
Frame aperture on screen ....
Recognize sound film ....
Recognize if film needs rewinding ....
Thread film for sound projection ....
Thread film for silent projection ....
Operate by hand for several frames ....
Focus properly ....
Frame picture on screen ....
Stop for single frame projection ....
Control sound quality ....
Reverse machine ....
Rewind film ....
Clean lenses ....
Clean film gate ....
Oil machine ....
Replace projection lamp ....
Replace exciter lamp ....
Replace belts ....
Replace machine and speaker for return to storage ....

Opaque Projector

Connect electrical plug
Adjust for screen size ....
Show opaque materials ....
Use arrow pointer (if available) ....
Change projector bulb ....
Clean lenses ....

Lantern Slide 3¼ × 4

Remove from case and set up ....
Insert slide carrier ....
Adjust tilt and picture size ....
Insert several slides ....
Focus slides properly ....
Replace in carrying case ....

2 × 2 Slide and Filmstrip Projector

Remove from case and set up ....
Frame aperture on screen ....
Insert slides or filmstrip ....
Focus properly ....
Clean lenses ....
Replace bulb ....

Screens

Determine correct distance for screen from projector ....
Set up properly ....
Darken room as needed ....
Fold up properly ....
General care of screens ....

Film Care and Inspection

Place on rewind machine ....
Clean film ....
Recognize damage ....
Splice film ....
Notch film ....

Magnetic Recorder

Set up and connect A.C. plug ....
Connect microphone ....
Thread tape in recorder ....
Record approximately one minute ....
Connect direct to radio and playback recording ....
Replace all material and pack ready to carry ....

Playback

Set up and make electric connection ....
Set for proper speed of record ....
Turn on amplifier ....
Play record ....
Replace all material and pack ready to carry ....

Name ....

TEXTS

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Haas, Kenneth B., and Harry Q. Packer, *Preparation and Use of Audio-Visual Aids*, 3rd ed., Chaps. 1, 2, 3, 4. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1955.

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OTHER REFERENCES

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Finn, James D., *The Audio-Visual Equipment Manual*. New York: Dryden Press, Inc. (Holt), 1957.

AUDIO-VISUAL MATERIALS

Films:

"Facts About Film," 15 min., sd., color, International Film Bureau, 1959.

"Facts About Projection," 16 min., sd., color, International Film Bureau, 1959.

"Projecting Motion Pictures," 10 min., sd., b&w, University of California, Extension, Educational Film Sales Department.

Filmstrips:

"Routine Checking of Audio-Visual Equipment," 46 frames, si., b&w, State College of Washington.

15

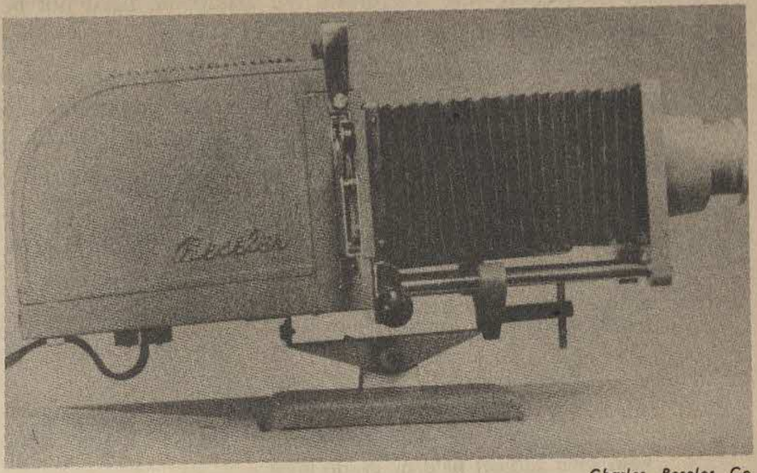
SLIDES AND SLIDE PROJECTORS

THE LANTERN SLIDE is one of the oldest forms of projected pictures. It was developed over a period of many years from early experiments with the so-called "Magic Lantern."

The lantern slide has many advantages where still, projected pictures answer the needs of the instructor. The photographic slide, in black and white or color, or the handmade slide in its many different forms, can be adapted to nearly any training situation. The early development of the lantern slide in the United States was with the 3¼ x 4 slide. Later developments in the 1920–1930 period with miniature photography brought about the 2 x 2 slide. Both sizes are extensively used today in education and training. There are now other sizes in common use such as the 2¼ x 2¼, but in the United States the 3¼ x 4 and the 2 x 2 sizes are the most popular.

Standard Slide Projection

Equipment for the projection of the standard 3¼ x 4 lantern slide is relatively inexpensive. This equipment sells for approximately one hundred dollars. The larger types used in auditoriums cost several hundred dollars. The average classroom slide projector is quite simple and easily operated. It is composed of a mirror to reflect light, usually a 500-watt projection lamp, a set of condenser lenses, slide carrier, and objective lens.



3¼ X 4 INCH STANDARD SLIDE PROJECTOR.

Charles Beseler Co.

The entire equipment is enclosed in a metal case. In most instances this type of equipment has no motors or operating parts other than the slide carrier and the extension bellows. This equipment will give good service for many years. The projector usually comes equipped with a 12 inch focal length lens, but other focal length lenses are available if desired.

The Overhead Slide Projector

Several makes of standard size lantern slide projectors are available that can be used on the instructor's desk in the front of the classroom. By the use of several mirrors, a short focal length lens of approximately 5 inches, and a platform on which to place the slides, the projected picture is reflected on the screen. This equipment has many advantages in certain types of instructional situations, since the teacher has complete control of the equipment and can use as many or as few slides as needed. The instructor can point to specific material on the slide while discussing its content. He also has the advantage of facing the class at all times while discussing the projected slide. The overhead type lantern slide projector has a higher

USING THE OVERHEAD SLIDE PROJECTOR IN A READING PROGRAM.

State University of Iowa

wattage projection bulb; therefore, the classroom need not be entirely darkened during the showing. In this way, the students can take notes while the slides are being projected.

The overhead slide projector is especially effective in connection with the use of the tachistoscope. Word recognition, sentence recognition, and other teaching techniques make use of the overhead slide projector's unique feature. With the use of special masks on the projection platform, it is possible to show small areas of a slide on which are such items as words, sentences, or a series of numbers.

1. Define the word "tachistoscope":

2. Investigate the tachistoscope and indicate several ways this equipment would be of value to you in your own subject field or grade level.

   a.

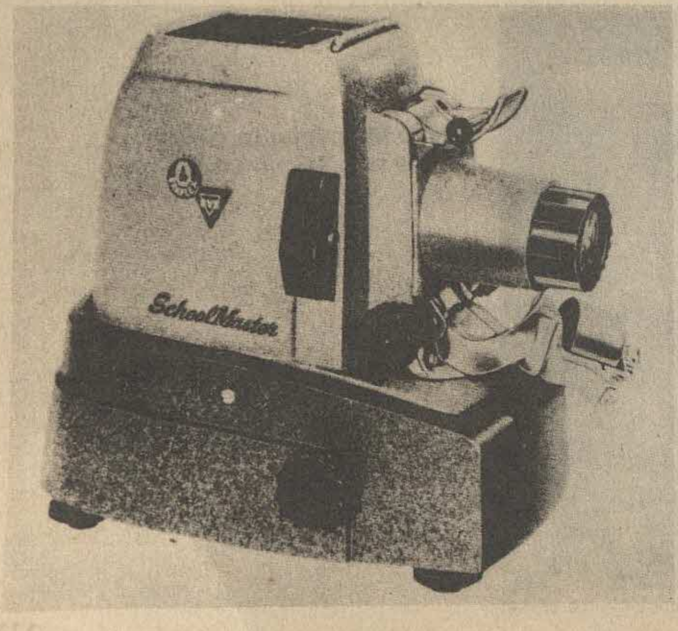
   b.

   c.

Projecting the 2 x 2 Slide

The average 2 x 2 slide projector is a lightweight, easily-moved projector that can be purchased in several different combinations. Some teachers prefer and use the 2 x 2 slide projector that will accommodate only slides. Others prefer the 2 x 2 slide projector combination in which filmstrips may also be projected. Some combination projectors of this type accommodate the 2 x 2 slide, the single frame filmstrip, and the double frame filmstrip. The double frame filmstrip is the type made in most 35mm. cameras. The combination 2 x 2 slide-filmstrip projector is probably the most commonly used projection equipment in the schools today.

Graflex, Inc.



THE 2 X 2 SLIDE PROJECTOR COMBINATION WITH FILMSTRIP PROJECTOR.

The 2 x 2 slide projector is easily operated, but certain precautions are necessary. Lenses should be cleaned frequently. If a carrying case is available, the projector and all its parts should be kept in the case.

Most of the 2 x 2 slide projectors equipped with projection bulbs of less than 300 watts do not have ventilating fans. At present, the trend is to put ventilating fans in projectors using over 300-watt bulbs. Ventilation in a 2 x 2 projector is important, because it keeps excessive heat away from the material being projected. If slides are to be used in the projector for lengthy periods of time, a ventilating fan will often prevent overheating or damage to the slides.

Key considerations in the selection of 2 x 2 slide projectors are:

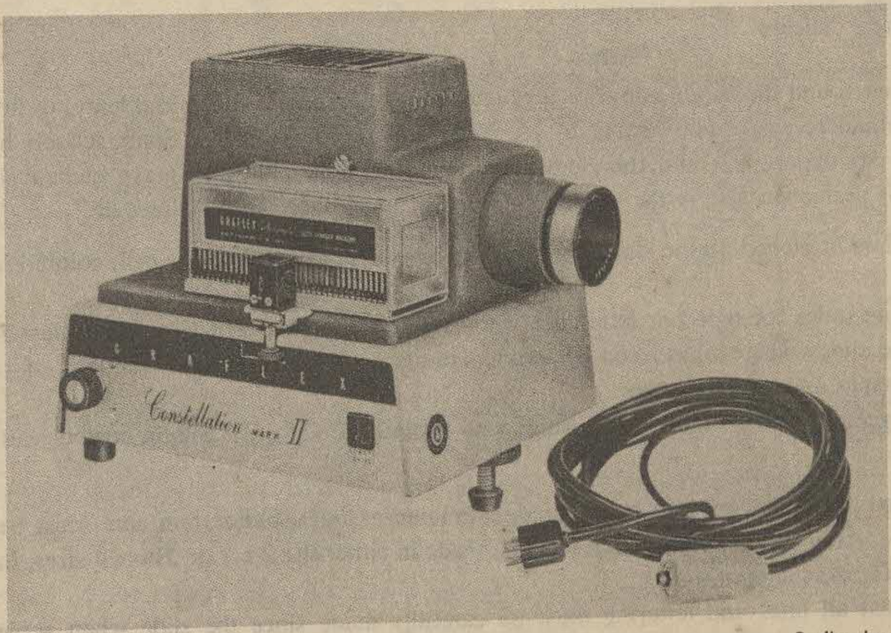
A. Good objective lenses.

B. Adequate bulb wattage to provide satisfactory pictures in the classrooms where the equipment will be used.

C. Good power cord and connections.

D. Sturdy construction and easily accessible elevating devices.

Larger, more expensive types of 2 x 2 slide projectors are available for special use in larger classrooms or auditoriums. These projectors often have 750 or 1000 watt bulbs, a better ventilating system, and a better system of lenses. Several different focal length objective lenses are available to make the equipment useful in different size rooms and with different size screens.



Graflex, Inc.

AUTOMATIC SLIDE PROJECTORS CAN BE OPERATED BY REMOTE CONTROL.

Automatic Slide Projectors

Several kinds of automatic slide projectors are available in both the 3¼ x 4 and the 2 x 2 sizes. The automatic control on slide projectors, which changes slides by a push button in the front of the classroom, is used in auditoriums where the instructor wishes to have complete control of the operation. This system usually has a belt, tray or some other container into which the slides can be placed prior to showing. The slides can then be advanced by a remote control switch at the front of the room. There are other types of automatic slide projectors used in industrial organizations, retail stores, and display rooms which automatically advance the slides at set time intervals, but this type of automatic equipment has little use in the average school.

Advantages in Using Slides

Where motion is not an essential element, the lantern slide has many advantages in teaching. The equipment for projecting either the 3¼ x 4 or the 2 x 2 slide is easily operated and inexpensive to maintain. Slides can be used in any number or order desired. Being relatively inexpensive, slides are often kept in the classroom or laboratory or within the individual school building, where they are available for instant use by teachers. The use of audio-visual materials at the exact time they are needed in the unit of study cannot be overestimated. The slide often fits this need. In addition, many schools have camera equipment and facilities for making slides. Large collections of slides can be made of the local area or state which will contribute a great deal to the learning environment.

Many schools are using the small 35mm. camera in the making of 2 x 2 slides for permanent pictorial records of school journeys or field trips. Such slides can be used to review a field trip or to introduce future field trips. Another prominent use of the slide is for the projection of map slides, either on the screen for enlarged view, or onto the chalkboard, where student's may trace the maps for individual or group projects. Handmade slides, which will be discussed next, are quite popular and used in many schools. Such slides may be drawn on etched glass, etched plastic, or onto gelatine-coated glass. The silhouette slide is also used extensively in the elementary grades.

Handmade Slides

Schools have found the handmade slide a valuable asset in many teaching and learning situations. The handmade slide can be easily made either by the student or by the teacher. Some schools have combined projects of the art department and the elementary department to plan and make etched glass or etched plastic slides for permanent use in the schools. Types of handmade lantern slides are:

A. Etched glass or etched plastic slides for drawings in pencil, ink, colored pencil, colored ink, or colored slide crayons.

B. Cellophane slides for typed or lettered materials and placed between clear slide glass for projection.

C. Silhouette slides where objects or cut out materials are placed between sections of clear glass for projection of shapes and/or silhouettes.

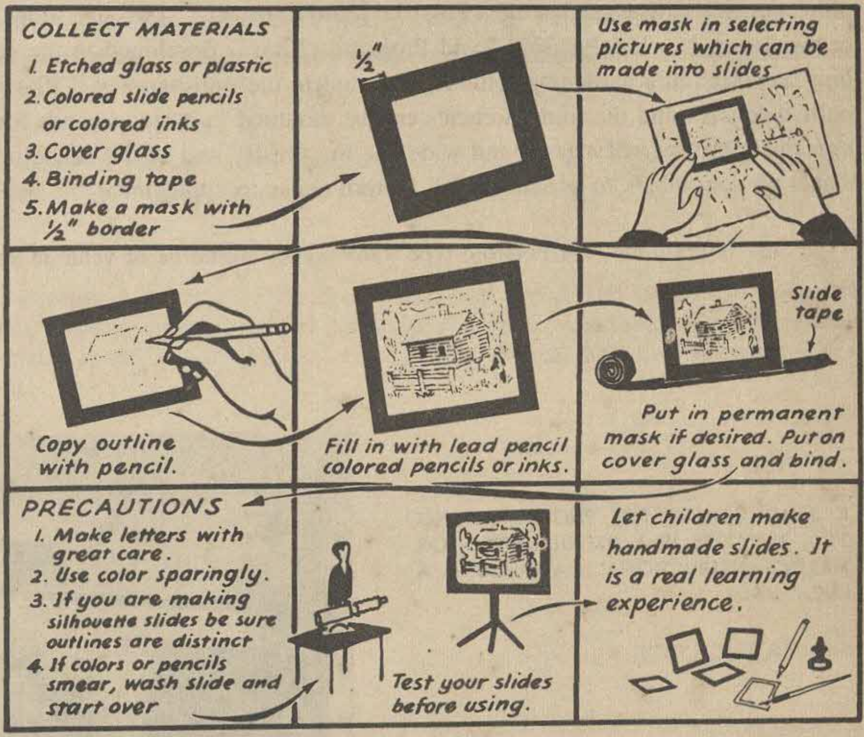
D. Clear or gelatin-coated slides for drawings with ceramic pencil or, if gelatin coated, with India ink or slide ink.

A person need not be an artist to make handmade lantern slides, but certain care must be taken to get the best results. Although handmade slides can be made in either the 2 x 2 or 3¼ x 4 sizes, the 2 x 2 slides are quite small for drawing purposes.

Remember that all lines and lettering must be carefully made since the slide when projected, will be enlarged from twenty to twenty-five times, and all defects will be greatly exaggerated.

3. Indicate how the handmade lantern slide would be helpful to you in your own subject matter field or grade level, and list the different types of handmade slides you would use.

4. Make the following handmade slides (hand in to your instructor):
   a. Make one test slide on etched glass or plastic using different grades of pencils, colored India inks, and colored slide crayons. Project the slide to observe the effect of shading and color.
   b. Make one etched glass or plastic slide in your own subject matter field. In selecting the subject for the slide, consider carefully some subject or unit of study where a slide would be valuable. Use color on the slide if possible.
   c. Make one cellophane slide using typed material. Project it to see if the words are clear and if the material is well arranged on the slide.


COLLECT MATERIALS
1. Etched glass or plastic
2. Colored slide pencils or colored inks
3. Cover glass
4. Binding tape
5. Make a mask with ½" border
½"
Use mask in selecting pictures which can be made into slides
Copy outline with pencil.
Fill in with lead pencil colored pencils or inks.
Slide tape
Put in permanent mask if desired. Put on cover glass and bind.
PRECAUTIONS
1. Make letters with great care.
2. Use color sparingly.
3. If you are making silhouette slides be sure outlines are distinct
4. If colors or pencils smear, wash slide and start over
Test your slides before using.
Let children make handmade slides. It is a real learning experience.

STEPS IN MAKING HANDMADE LANTERN SLIDES

Handmade lantern slides must be carefully planned and made if they are to be of specific value in your teaching. With careful instruction, children can make excellent slides that will contribute in several ways to the learning process. Children gain first from the research experience in selecting subject matter; second, from the planning of the slide; and third, from the actual art work in completing the slide. When planning slide projects for children to draw, it is often advisable to let them sketch the material on paper to the exact size needed on the slide, then, after teacher approval, have them redraw the picture on the etched glass or plastic.

Photographic Slides

Photographic slides are produced both in black and white and color. The black and white lantern slide is usually produced on a sensitized photographic plate with the emulsion or picture side covered with glass. Color slides are often produced on a colored film and bound between two pieces of cover glass.

Photographic slides are easy to make. Many schools have cameras and the darkroom facilities necessary for making slides. The black and white 3¼ x 4 slide is usually photographed in a 2¼ x 3¼ camera. The negative is developed, fixed, washed, and dried. Then the negative is exposed to a 3¼ x 4 lantern slide plate. That plate is then developed, fixed, washed, dried, masked, covered with a cover glass, and bound with slide binding tape. The slide is then ready to be projected.

The small, 2 x 2 lantern slide can be made in black and white in the same way as the larger slide, by using a 35mm. camera, or a size that would give approximately a 1 x 1⅜ negative. The negative is printed onto the 2 x 2 slide plate. Most color slides are photographed on color film, with the film developed by the manufacturer. The film is cut, bound in paper mounts, and returned to the sender. If the color film is handled a great deal, the paper mounts should be removed and the film bound with glass covers. This will prevent scratching or other damage to valuable color slides. A popular method of protecting color slides is with the "Readymount," a lightweight 2 x 2 slide mounting of cardboard with a cover glass which is preassembled.

A second recent development is the Polaroid Transparency system for making slides. Polaroid Land projection film can be used in most Polaroid Land Cameras. Two size slides can be produced, the 2¼ x 2¼ or the 3¼ x 4. The Polaroid Land Projection Film is developed in the camera in two minutes and need only be placed in a hardening solution to complete the transparency. Plastic slide mounts are available for both slide sizes and the transparencies can be mounted in a few seconds for projection. This new type of immediate transparency has found wide use in industry and in the schools. Teachers need not be professional photographers to produce good lantern slides to supplement the instructional program.

5. Indicate how the Polaroid type transparency would be of value in your teaching.

A 35MM CAMERA FOR PHOTOGRAPHING 2" X 2" SLIDES IS A USEFUL DEVICE FOR MAKING INSTRUCTIONAL MATERIALS IN A LOCAL AREA.

State University of Iowa

BINDING A 2 X 2 INCH SLIDE.

Suggestions for Using Slides

The lantern slide has so many different uses in education and training that it would be difficult to list all the various possibilities. The slide is a practical, inexpensive method of bringing pictorial materials into the classroom to help vitalize learning situations and to give children the opportunity of coming closer to reality. Slides are used in every phase of education, from kindergarten through high school. They are also used extensively in professional courses in most of our leading colleges and universities.

Perhaps one of the great errors common in the use of lantern slides is the showing of an entire series at one time. One of the factors that make slides especially effective is their capability of being shown in any desired order. The slide can remain on the screen a long period for discussion and can easily be brought back for review or further discussion if desired.

An entirely new aspect of teaching presents itself when a teacher first explores the possibility of making some of his own lantern slides. The picture stories of his travels are readily available to him when he returns to the classroom.

6. Project: If camera equipment is available, divide the class into groups and have each group produce several photographic slides. Slides may be either 3¼ x 4 or 2 x 2, depending on the camera equipment available. Slides should be planned, and an outline should be turned in, showing how they will assist with some specific unit of instruction.

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"Handmade Materials for Projection," 20 min., sd., b&w, Indiana University, Audio-Visual Center, 1956.

"How to Make Handmade Lantern Slides," 21 min., sd., color, Indiana University, Audio-Visual Center, 1947.

"Lettering Instructional Materials," 20 min., sd., b&w, Indiana University, Audio-Visual Center, 1955.

Filmstrips:

"Handmade Lantern Slides," 51 frames, color, Ohio State University, 1956.

The Jam Handy Corporation

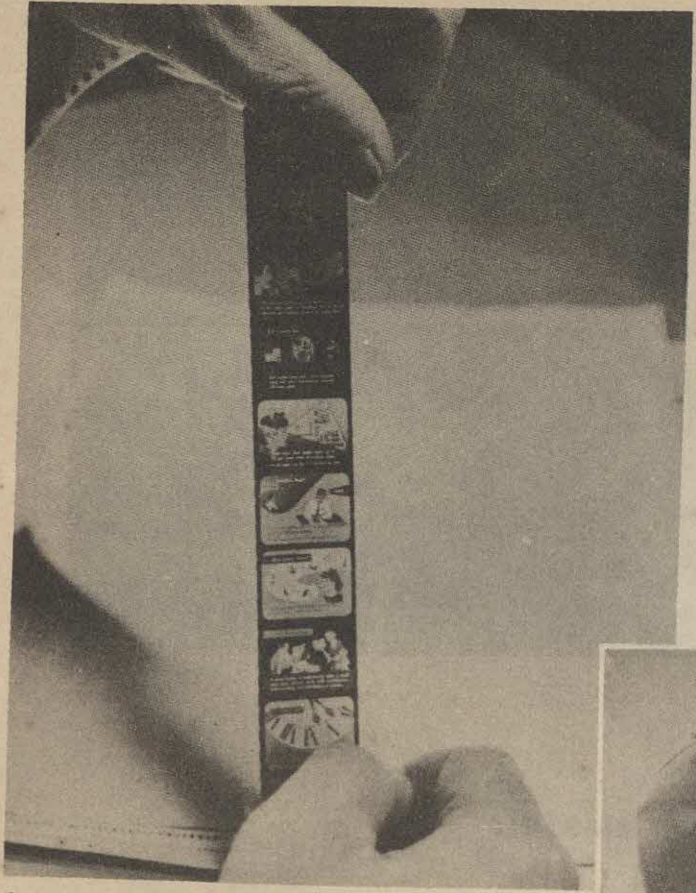
16

FILMSTRIPS AND FILMSTRIP PROJECTORS

THE SILENT FILMSTRIP is one of the more commonly used projected media. It will probably be found in more classrooms in the United States than most other types of projected pictures. The popularity of the filmstrip is due to several factors—first, the low cost of the filmstrips, and second, the lightweight, inexpensive projectors available for showing this type of material. Many schools have purchased filmstrip libraries consisting of many different subjects. The materials are readily available in each building, where the teacher can have immediate use of them to meet specific instructional needs.

The filmstrip was first released in quantity to the schools in the mid-1920's and was called "Picturols." The so-called "Picturols" were made possible by the development of noninflammable 35mm. motion picture film. This new film offered a safe means of projecting individual pictures. Picturols were popular but met considerable objection from many educators who had made large collections of the standard 3¼ x 4 lantern slides. The early filmstrips were of questionable photographic quality and in many instances had very little true educational content.

The popularity of the miniature camera in the 1930's soon brought about the making of the 2 x 2 lantern slides. With the release of the 2 x 2 slide, most manufacturers of filmstrip projection equipment started producing a combination filmstrip and 2 x 2 slide projector to be used for both purposes. Due to the demand from the users of the so-called miniature cameras, some manufacturers of projection equipment released a "tri-purpose projector.



FILMSTRIPS ARE WIDELY USED AT ALL LEVELS OF INSTRUCTION.

Society for Visual Education, Inc.

TEACHERS SELECTING FILMSTRIPS

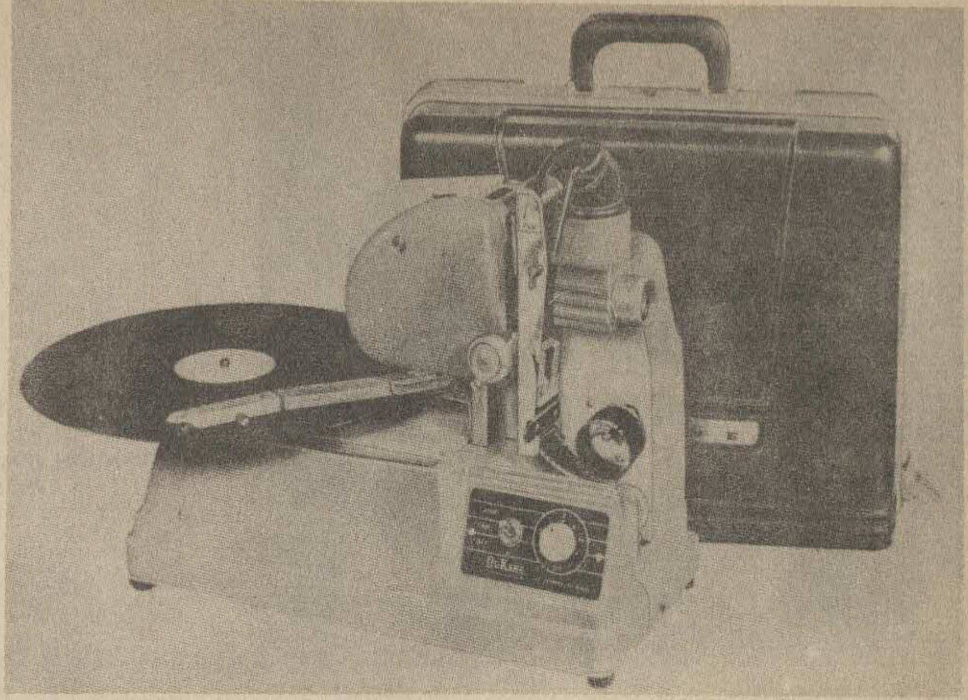
San Diego City Schools

This equipment would project the single-frame filmstrip, the 2 x 2 lantern slide, and the newer double-frame filmstrip of the type made in most miniature cameras.

While the filmstrip was in popular use in many schools prior to World War II, a great emphasis was placed on this type of projected picture in the civilian and military training programs. New and better projectors were developed during and immediately following World War II. After the war, more emphasis was placed on the improvement of the educational content of filmstrips.

Today the silent filmstrip is playing a very important part in all types of classrooms and at all educational levels. Filmstrips are also being used everywhere, from the one-room rural school to the large modern university.

Thousands of filmstrips are now available and new subjects are being released weekly. Alert teachers



DuKane Corporation

SOUND FILMSTRIP PROJECTOR.

will investigate the great wealth of material available to them in filmstrip form and will plan to select those that will contribute to the course of study. *Proper selection of filmstrips is important—preview the materials before using them in your classes.*

1. How many pictures are there in an average filmstrip?

Sound Filmstrips

One of the developments in the filmstrip field during the late 1930's was the sound filmstrip. The sound filmstrip is often called the "sound slidefilm." The sound filmstrip is the same size as the silent filmstrip (35mm. in width, with single-frame pictures), but in place of captions and titles to explain the pictures, the explanations are provided on a record or transcription which is synchronized with the pictures. The sound is usually recorded on records playing at 33⅓ r.p.m. An audible ring or ping, signals the operator to advance the filmstrip to the next picture. On some of the more advanced equipment the audible ping is removed, and in its place an electronic device advances the filmstrip by means of sound waves or light waves.

The automatic filmstrip projector eliminates the possibility of a lack of synchronization between the filmstrip and the sound record. It allows the instructor to operate the equipment himself.

The sound filmstrip, or slidefilm, is used extensively in industry and by the armed services. Industry has found that it can produce sound filmstrips at the main factory or plant and send them to distributors or dealers in every section of the country. In this way, changes in design can be shown, instructions can be given on repair and maintenance of equipment, and sales can be stimulated. The armed services have also used the sound filmstrip as an important means of standardizing the training of their personnel. Some sound filmstrips have been used in schools, but on a very small scale compared with industry. Most schools continue to use the silent filmstrip as one of the basic instructional materials.

COMBINATION FILMSTRIP AND 2 X 2 SLIDE PROJECTOR.

St. Louis Public Schools

Equipment—Silent Filmstrip Projectors

The equipment for showing the silent filmstrip is very versatile. It is available with many different kinds of illumination from the small 100-watt projector for individual or small group use to the larger 1000-watt projector for use in auditoriums. Filmstrip projectors are inexpensive. An average-priced classroom-type filmstrip projector with a 300- or 500-watt projection lamp and cooling fan costs from 75 to 125 dollars. Filmstrip projectors are light weight, averaging from five to eight pounds, and can be transported from room to room or from meeting to meeting with ease. Some classroom-type projectors with 300-watt projection lamps are equipped with a cooling fan. Due to excessive heat that might damage the filmstrip, projectors using lamps with a wattage greater than 300 must use a cooling fan. Most of the conventional classroom-type filmstrip projectors come equipped with a 5 inch objective lens, but can be equipped with lenses from 2 inch to 11 inch focal length depending upon the room where the equipment is used.

Equipment—Silent Filmstrip Combined with 2 x 2 Slides

One of the types of filmstrip projector in common use today is the combination, which projects both filmstrips and the 2 x 2 lantern slide. The projector is designed to allow a slide carrier to be inserted. Masks for holding the filmstrip must be removed when the 2 x 2 slides are projected. The changeover between the filmstrip and the slide is easily made in a matter of a few seconds.

Selection of the projector to show filmstrips or 2 x 2 slides depends on the needs of the school or training program. Consideration should be given to:

A. Focal length of the objective lens to meet requirements in the different rooms.
B. Wattage of the bulb in the projector to meet needs in small, medium or large rooms.
C. Cooling fan in the projector to permit prolonged showing of individual frames of a filmstrip. If a projector with a 300-watt lamp or greater is planned, a cooling fan is necessary.

Equipment—Sound Filmstrip

The equipment necessary to show sound filmstrips consists of a silent filmstrip projector and a phonograph turntable or playback with amplifier and speaker. The playback equipment should accommodate 33⅓, 45, and 78 r.p.m. records. Several sound filmstrip projectors are manufactured with the projector, turntable, amplifier, and speaker built into a one-unit case. Although the one-unit projector is convenient, sound filmstrips can be used on a regular silent filmstrip projector, and the record can be played on any standard record player. The operator should first thread the filmstrip into the projector and advance the filmstrip to the first frame to be projected. Then he should place the record on the playback and start it. The sound should be adjusted to the desired volume and the pictures advanced on the filmstrip projector when the ping or ring is amplified through the speaker. In this way, the sound and picture will be synchronized.

Automatic Filmstrip Projectors

Several automatic filmstrip projectors are available that will advance the filmstrip at a set, determined rate of speed. Such equipment can also be operated with a push-button switch by the instructor. The automatic filmstrip projector is usually used in the larger lecture rooms or auditoriums. New developments and advancements in automatic filmstrip equipment may make it available in the classrooms of tomorrow. The primary advantage of the automatic projector is that the instructor can pace his use of pictures.

2. Are all filmstrip projectors adaptable for the showing of 2 x 2 slides?

3. List two good directories of filmstrips.

Los Angeles Public Schools

A PROJECT COMMITTEE PREVIEWING A FILMSTRIP.

4. Experiment with and describe how you would use filmstrips for projecting materials on the chalkboard for tracing.

5. From the directory of filmstrips, select ten titles in your own subject field or grade level which you would recommend to be purchased for your use. Indicate the source of each.

	Title	*Source*
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		
i.		
j.		

6. Outline the different steps you would take in the utilization of a filmstrip in your class.

San Diego City Schools

STATE INSTITUTE OF EDUCATION
Govt. of West Bengal

INEXPENSIVE VIEWER MAKES PREVIEWING FILMSTRIPS EASY.

7. Preview at least five filmstrips in your own subject matter field or grade level, and write an evaluation of each: (Use the evaluation form provided as a sample in making your forms.)

FILMSTRIP EVALUATION FORM[1]

Evaluator's Name ____________

Date ____________

Title

Producer

Sound ________ B & W ________ Color ________ Length ________

Silent ________ B & W ________ Color ________ No. of Frames ________

Maturity Level: Prim. ____ Elem. ____ Jr. High ____ Sr. High ____ College ____ Adult ____

Technical Quality: Photography: Poor ____ Fair ____ Good ____ Excellent ____

Printed Captions: Poor ____ Fair ____ Good ____ Excellent ____

Sound: Poor ____ Fair ____ Good ____ Excellent ____

Purposes filmstrip might serve: High—Rating—Low

(1) 1 2 3 4

(2) 1 2 3 4

Overall Rating: Poor ____ Fair ____ Good ____ Excellent ____

Summary:

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[1] Filmstrip Evaluation Form, 1312 West Johnston St., Madison, Wis., W. A. Wittich, Editor.

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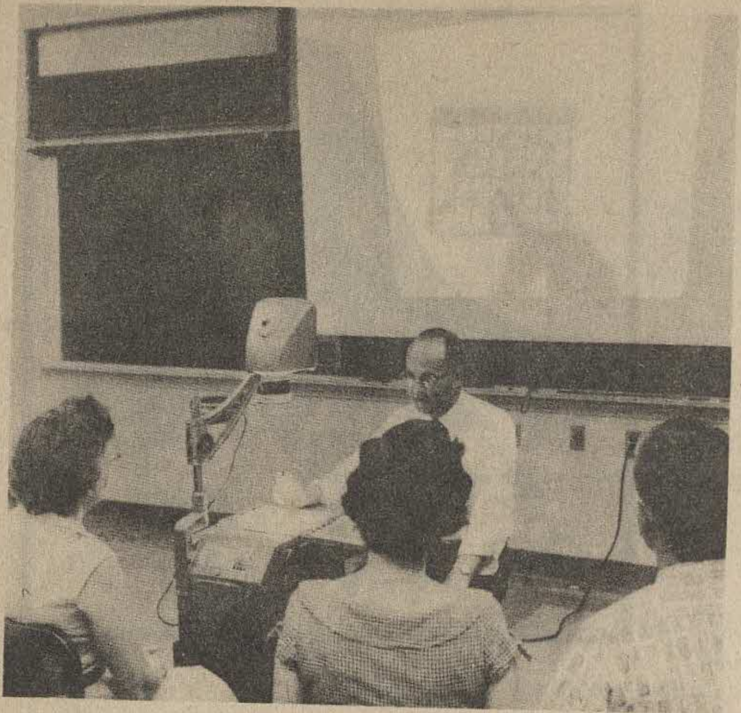
17

OVERHEAD PROJECTORS

THE OVERHEAD PROJECTOR is one of the newer developments in projection devices. This equipment was developed to meet specific training needs during World War II, and it is now widely accepted by schools, business, and industry. The overhead projector is similar to the overhead lantern slide projector (see Chapter 15—slide projectors), but uses a larger stage or platform. It can project transparent materials 10″ x 10″ or larger. The large image makes it possible to use overlays or transparencies. The projector adapts itself to many instructional situations and is capable of projecting materials that would be impossible with other equipment.

By the use of a short focal length lens and mirrors to reflect the image, this equipment is used in the front of the classroom. With it the instructor has the advantage of always facing the class while presenting the visual lesson. Many teachers find this projector of great value in rooms that cannot be properly darkened for other types of projection. Transparencies can, in most cases, be successfully projected in rooms with the lights on, and with windows open for ventilation.

In using the overhead projector, the best results will be obtained with a large screen. At a distance of only twelve feet from the screen, an 8′ x 8′ picture is obtained. The larger screen size allows the projection of more detailed transparencies. The picture should not be projected too high on the screen, because it often causes a "keystoning" of the picture. (Keystoning is the effect obtained when the picture is wider at the top than at the bottom.) In many training situations where it is important to have a square picture on the screen, the top of the screen is tilted forward to eliminate the keystoning effect.



THE OVERHEAD PROJECTOR IS USED AT THE FRONT OF THE POOM.

State University of Iowa

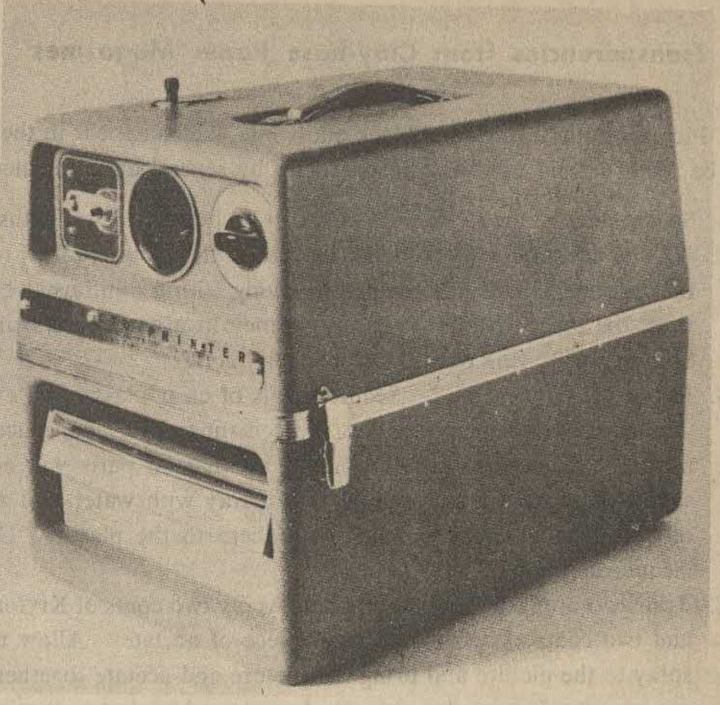
Advantages of the Overhead Projector

One of the special advantages of the overhead projector is the method of projecting simple sketches, calculations, and diagrams. These can be made extemporaneously, in much the same way that chalk is used on the chalkboard. Drawings and sketches can be made on sheets of plastic on the flat platform with a ceramic pencil during the class period. Teachers often make outlines and drawings prior to the class period and then fill-in and complete the information at the time it will be most effective. The overhead projector is especially useful in larger classrooms or small auditoriums where a chalkboard would be ineffective or useless. Transparencies or drawings can be projected as large as desired, enabling every student in the classroom to see.

Many different types of instructional material can be used on the platform of this projector. Shapes or symbols on colored plastic can portray games such as football, baseball, and basketball. Equipment layout in a factory can be made while the entire group is watching the demonstration. This affords a more effective teaching device by introducing movement into a still projection. Transparent solids, such as plastic gears and other materials of that nature, can also be projected. Through the use of colored plastics to indicate different parts of the equipment, very effective teaching devices can be produced. Even liquids can be shown on the overhead projector. Chemical and physical properties of fluids can be studied when a transparent "Petri" dish is used. Liquids can be retained on the projection stage and reactions demonstrated.

Making Transparencies

Transparencies for use on this equipment can be prepared by various methods. Several techniques are available to instructors who wish to make their own transparencies. A grease, or ceramic-marking, pencil can be used for making simple drawings on clear acetate sheets. Transparent inks can also be used,



PROJECTO-PRINTER FOR MAKING TRANSPARENCIES FOR OVERHEAD PROJECTOR.

Ozalid Division, General Aniline and Film Corp.

if color is desired in the transparency. Ceramic pencil marks, however, can be wiped off with a dry cloth, while transparent ink marks are permanent. Colored ink can be applied with a Speedball pen to establish boundaries, and larger areas can be filled in with a sable brush.

Transparencies can be duplicated on a sensitized diazo foil when the original is drawn on tracing paper or cloth. A darkroom is not needed for the making of transparencies, for all of the operations can be accomplished in a normally lighted room. The diazo foil is exposed, through the drawing, to either sunlight or ultra violet light for the exposure. The diazo foil is developed in the presence of ammonia vapor to produce a dye image transfer. Diazo foils are available in various colors, such as red, yellow, blue, black, green, and sepia. The different colors of the foils offer an added advantage in the making of overlays, where part of a drawing is made in one color, and then one or more additional parts of the same drawing are made on another colored foil. The different transparencies are mounted in such a way that the instructor can easily flip the added material over the background. This makes it possible for the instructor to add transparencies to the original drawing, giving pertinent information as the lecture or discussion progresses.

Producing Transparencies from Pictures or Text Illustrations

If pictures from books or magazines are to be copied the reflex process method is used. The original and Transferon negative transfer paper are placed together on an exposure unit and exposed as directed. Remove the exposed negative from printer and place it with Transferon positive film in a processing machine, where it will come into contact with a developing chemical. On removal from the developing machine, peel the transfer paper away from the positive film and wash the latter for a few minutes. The transparency is then ready for mounting and use. This is a quick and efficient way of producing copies of charts or other illustrations from books or magazines. Portable printing and processing equipment for producing transparencies by the reflex process method are available in many audio-visual centers.

Transparencies from Clay-base Paper Magazines

Pictures both in color and black and white, which appear in the better magazines using clay-base paper, can be removed and used as transparencies by several different methods.

A. Scotch tape method. Scotch tape can be purchased in widths up to 24″ if desired, but the 10″ width is quite satisfactory. Roll the tape over the picture to be removed and rub gently. Pull the tape off the page. This lifts the picture along with a thin layer of the paper. Moisten the paper and roll it off the tape. Mount the transparency in a cardboard frame and spray with transparent lacquer. Spraying will bring out the color in the picture.

B. Rubber cement method. Secure sheets of clear plastic and evenly coat picture and plastic sheet with thinned rubber cement. Allow the cement to dry, then place the rubber cement coated sheet to the picture. Be sure to rub the picture so that all parts will adhere to the coated plastic. Place the sandwich of plastic and picture into a tray with water and allow to soak about five minutes. Peel off the paper and the picture will adhere to the plastic. Dry, mount, and spray with transparent lacquer or plastic.

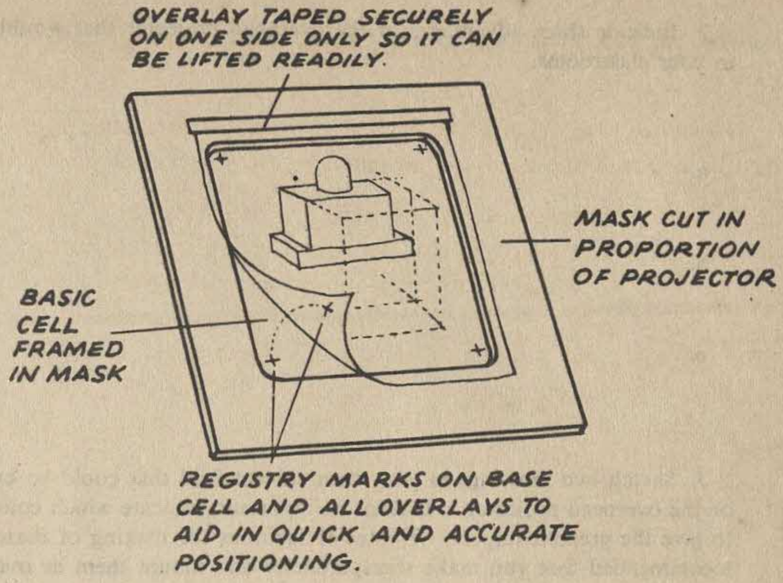
C. Transparent plastic spray method. Apply two coats of Krylon spray on the face of the desired picture and two coats of spray on a clear piece of acetate. Allow to dry and then apply one more coat of spray to the picture and bring the picture and acetate together in a sandwich. Place sandwich in dry mount, press between two pieces of paper and heat at approximately 275 degrees for about 45 seconds. Remove from mounting press and place in tray of soapy water for about five minutes. Peel off the paper and wash the picture with cotton to remove the clay backing. Allow to dry, mount, and spray another protective coating to the back side of the transparency. Adhesive, acetate sheets which can be used for this type of work are also commercially available.

TRANSPARENCIES WITH OVERLAYS.

Charles Beseler Co.

Mounting

Transparencies should be mounted on a cardboard frame that has been cut with a proper size opening. Different types of mounting tape can be used for this purpose. If several transparencies are to be combined as overlays, great care should be taken to mount them so that each cell will register on the original when


OVERLAY TAPED SECURELY ON ONE SIDE ONLY SO IT CAN BE LIFTED READILY.
MASK CUT IN PROPORTION OF PROJECTOR
BASIC CELL FRAMED IN MASK
REGISTRY MARKS ON BASE CELL AND ALL OVERLAYS TO AID IN QUICK AND ACCURATE POSITIONING.

A REGISTRY MARK SHOULD BE PLACED IN THE CORNER OF EACH OVERLAY FOR ACCURATE POSITIONING ON TRANSPARENCY.

turned into position on the projector. In making transparencies for overlays it is recommended that a registration mark, or small cross, be placed in the corner of each original drawing so it will appear on each transparency. In this way, the cross on each transparency can be placed over the other to insure perfect alignment.

When the mounting of transparencies has been completed and mounted, they can easily be stored in filing cabinets, numbered, and identified as to content. Transparencies and overlays, made by the diazo process, should be stored when not in use, since bright light or sunlight will cause the colors to fade. However, normal projection will not harm the colors in the transparency.

Using the Overhead Projector

Some companies are now producing transparencies for the overhead projector. Map overlays are developed for study in the fields of geography, mechanical drawing, language study, and science, to name a few. The overhead projector has already been accepted by many teachers as one of the important devices to help enliven learning. Coaches have found this equipment very helpful in charting football, basketball, and baseball techniques. Many new uses for this equipment will, no doubt, be found when it has been tried more extensively at all levels of education.

1. What are the differences between the materials used in the overhead projector and in the opaque projector?

2. Indicate three advantages of the overhead projector that would make this equipment of special value in your classrooms.

a.

b.

c.

3. Sketch two drawings in your own subject field that could be employed effectively as overlays for use on the overhead projector. If color is important, indicate which color each transparency should be in order to give the greatest impact. (Note: If facilities for making of diazo foil transparencies are available, it is recommended that you make transparencies and mount them as overlays.)

4. Why should the technique of overlays be more effective in many learning situations than the showing of single, individual pictures?

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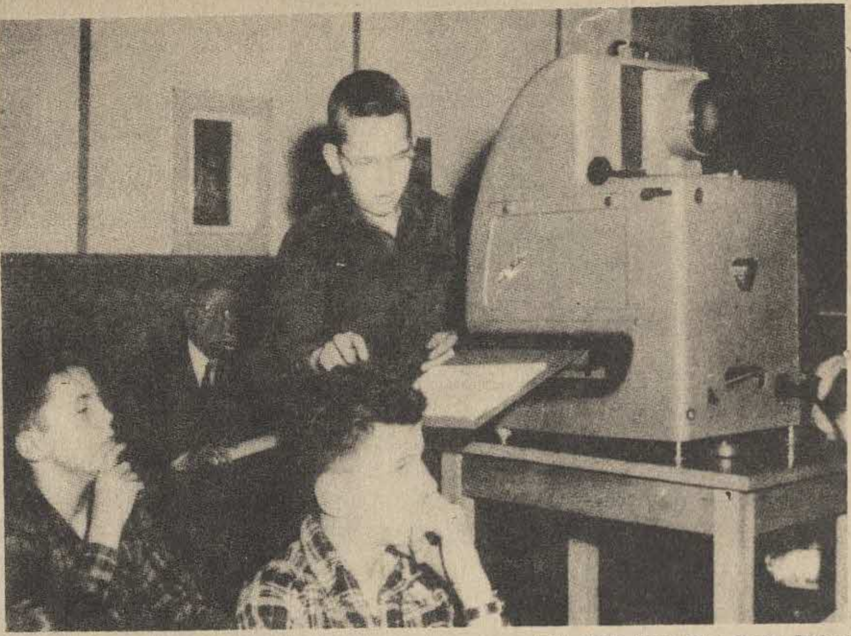


Iowa Audio-Visual Pilot Center Project

18

THE OPAQUE PROJECTOR

THE OPAQUE PROJECTOR is used to project an image of materials or object surfaces that are not transparent. It differs from most other types of projection equipment that shows only transparent materials. The greatest value of the opaque projector is its ability to project a wide variety of materials that students and teachers have prepared or collected. After the initial expense of purchasing it, the equipment can be operated daily without further cost other than that for replacement of projection bulbs. The opaque projector will be found of great value in all types of instruction, but is probably of greatest value in the elementary classroom.

Every teacher has, at some time or another, wished she had some means of enlarging and projecting small pictures for class observation. Materials for the opaque projector are numerous. Pictures from texts, flat pictures, photographs, post cards, children's drawings or written materials, and certain kinds of small objects, can all be projected and studied by the entire class. Projection of children's work with the opaque projector for discussion and comparison is an outstanding motivating device.

The opaque projector has been used in education for many years, but formerly the size of the material to be projected was limited to approximately 6″ x 6″. This prevented the showing of full-size pages of written material or large pictures. New developments in the opaque projector during and immediately following World War II greatly increased the illumination in this equipment and enlarged the projection aperture to accommodate a standard page of 8½″ x 11″. These developments have made this equipment much more useful in the classroom.

1. Indicate several different ways you would use the opaque projector in your classroom.

a.

b.

c.

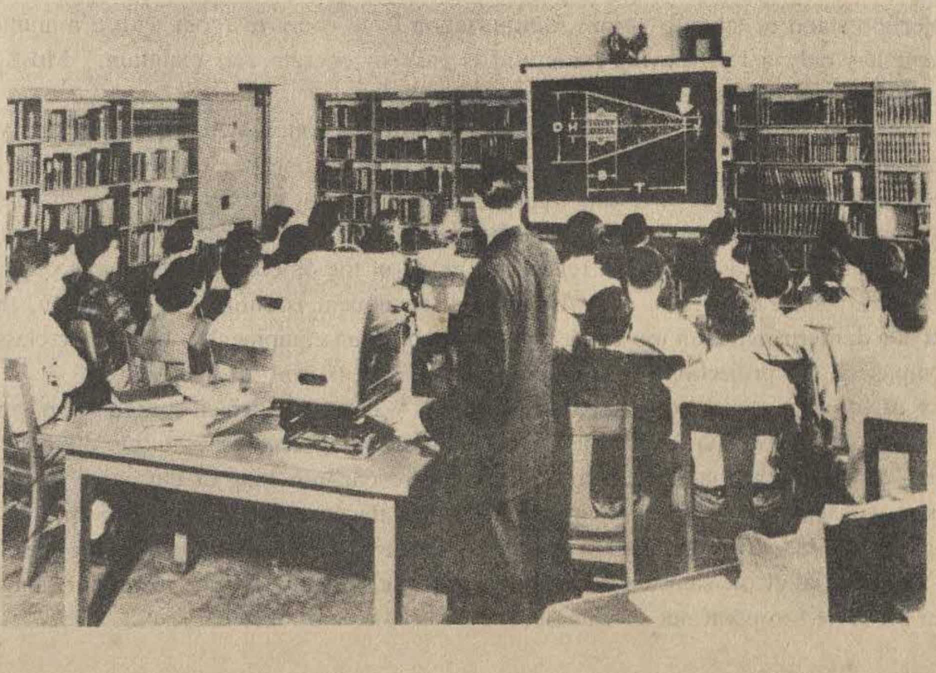
d.

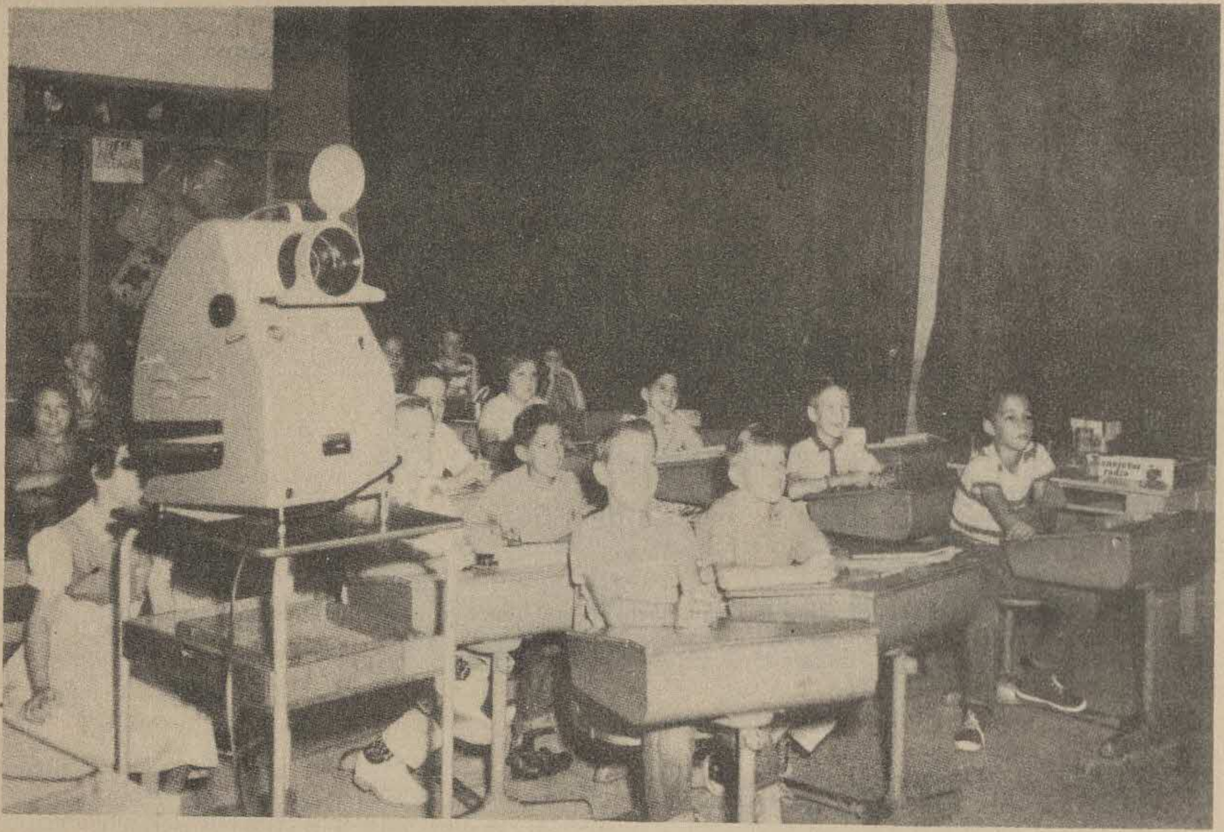
e.

2. Enumerate advantages of using this equipment in preference to other methods of presentation.

MATERIALS 8½ X 11 INCHES CAN BE SHOWN IN THE MODERN OPAQUE PROJECTOR.

Charles Beseler Co.





Dade County Schools, Florida

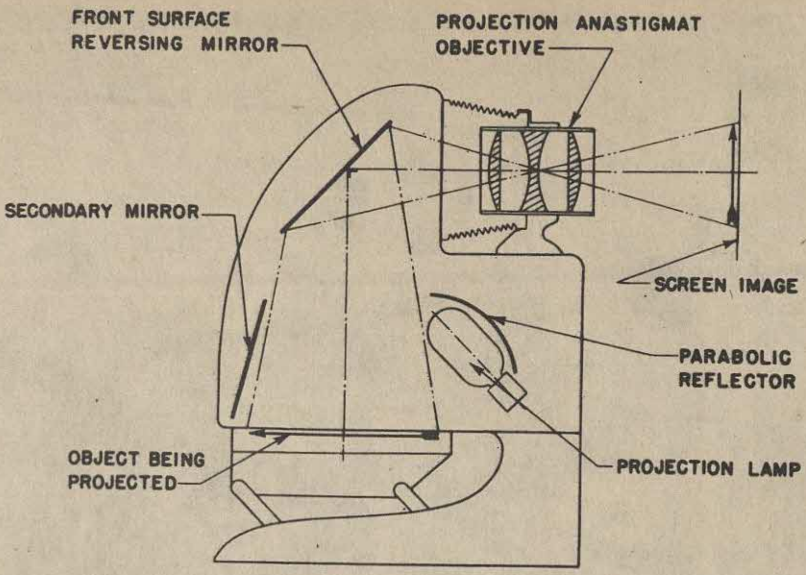
BEST RESULTS ARE OBTAINED WITH THE OPAQUE PROJECTOR WHEN THE ROOM CAN BE DARKENED.

Equipment

The equipment for projecting opaque objects is relatively large and bulky. It should be operated from a rolling projection stand or table to permit transportation from room to room with a minimum of lifting. This equipment has only a few moving parts and is easy to operate and maintain. Most opaque projectors have only one small motor which runs the cooling fan.

The principle of operation of the opaque projector is by reflection, which requires a high wattage bulb, usually 1000 watts. The light from the projection bulb is directed onto the platform or "platen" where the material to be projected is placed. The entire platen is surrounded by a series of mirrors that reflect the light from the projection bulb onto the opaque materials being projected (see Chapter 14). A large mirror placed at an angle above the item being projected reflects an image of the object through a large objective lens and then to the screen. Since projection with this type of equipment is entirely by reflection, the equipment must be used in a darker room than most other types of projection equipment. Unless the classroom can be darkened completely, the projection of opaque objects will not be too satisfactory.

One source of annoyance in the older opaque projectors was the fan, which caused the pages of the book or pictures to flutter. Newer developments in the modern equipment prevent this difficulty. New ventilating systems also keep the material much cooler, and prevent scorching or burning. A projected arrow or pointer is provided on some newer equipment to enable the instructor to point to specific items on the material being projected. This arrow is of great help to the teacher who wishes to operate the equipment and discuss the material at the same time. It eliminates the necessity for the instructor to move from the equipment to the screen to point out specific items.



Charles Bessler Co.

CROSS SECTION OF AN OPAQUE PROJECTOR.

The large objective lens on the opaque projector is of great importance in the projection of clear pictures. This lens should be kept covered when the equipment is not being used, and it should be cleaned with great care at regular intervals. The mirrors in the projector should be also cleaned frequently. Care should be taken to keep mirrors or lens free of finger prints. The heat generated in this equipment may permanently etch or burn such finger marks into the mirrors. Such marks will result in a loss of reflected light on the screen. Cleaning directions provided by the manufacturer should be followed in each instance.

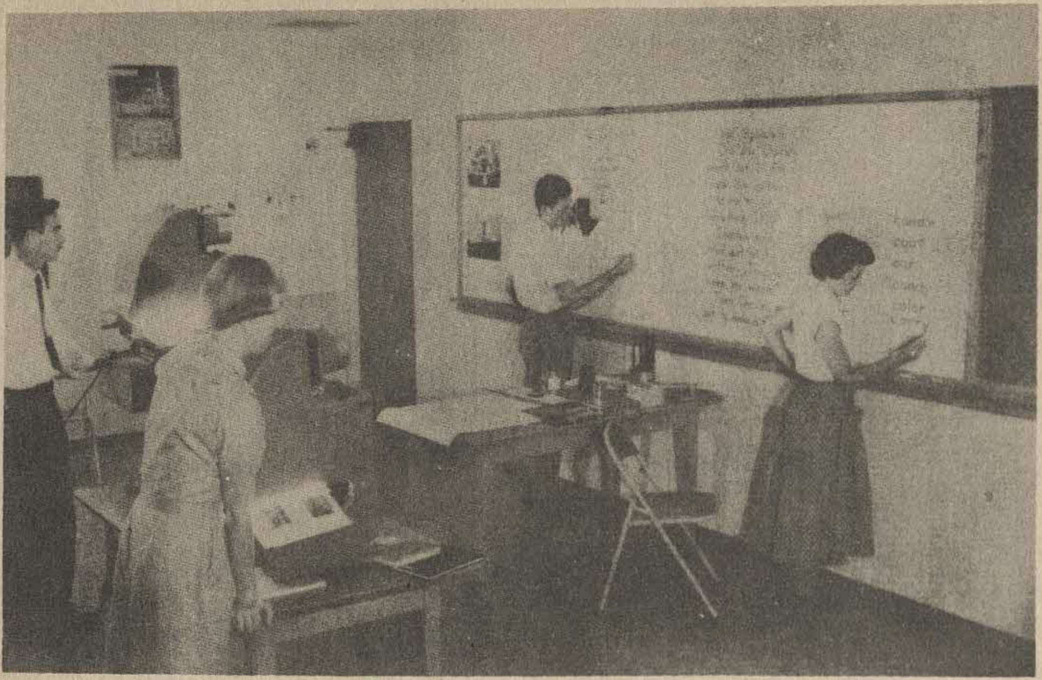
Opaque projection demands the use of a larger than usual screen because the material being projected is generally larger than other types of projected materials. Several screen sizes should be tried before the suitable one is selected for use with *your* opaque projector.

3. Check the following items on an opaque projector.
   a. What is the focal length of the objective lens? ____________________
   b. What is the largest object that can be projected? ____________________
   c. What screen size would be needed if this projector were used 20 ft. distance from the screen? _____ ____________________

Suggestions for Using the Opaque Projector

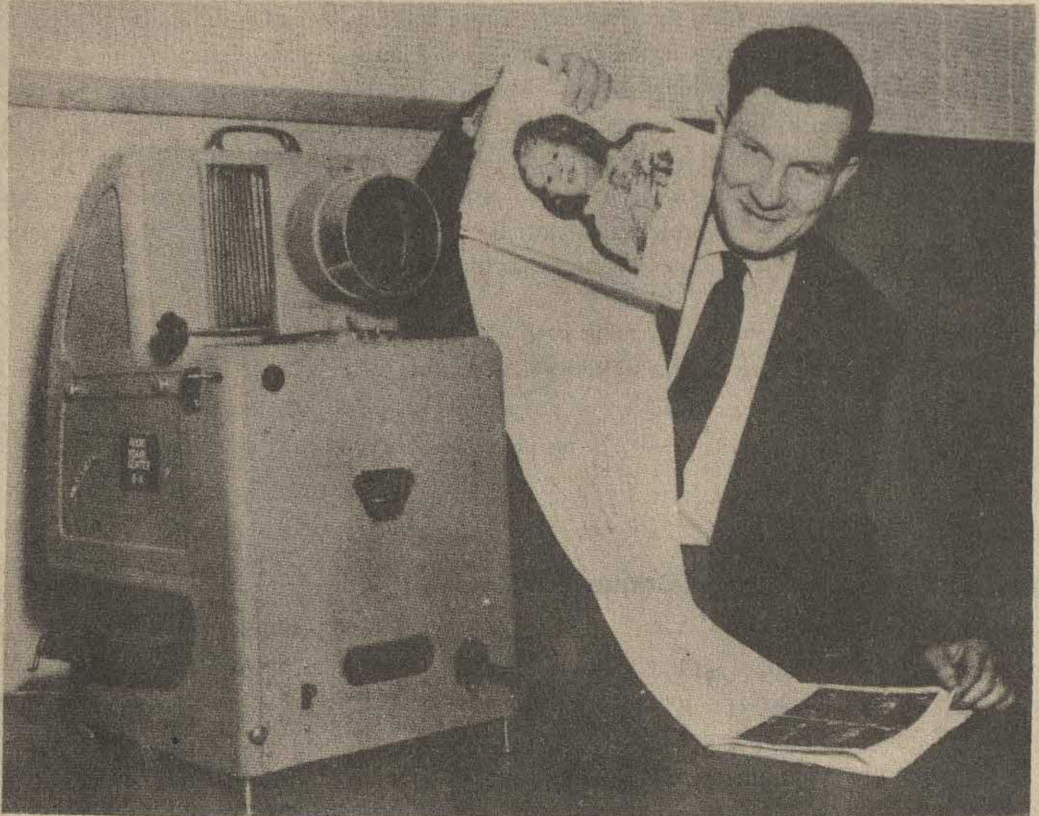
As indicated previously, there is practically no limit to the uses of the opaque projector. Wherever textbooks, magazines, newspapers, photographs, or other types of pictorial or printed material are available and helpful in teaching, this equipment is useful.

When an opaque projector is made available for use in his classroom, one of the first things that a teacher should do is start collecting materials. Such materials should be classified for ready use. An organized plan for collecting and classifying pictorial material will save the teacher hours of hunting and searching for specific pictures when they are wanted. Students can often help in locating and building such collections. The resourceful teacher will use collection projects as a part of the actual learning process.



San Diego City Schools

THE OPAQUE PROJECTOR IS USEFUL TO ENLARGE MATERIALS FOR POSTERS OR ONTO THE CHALKBOARD.



Washington State University

MATERIALS CAN BE MOUNTED ON HINGED BINDINGS FOR EASE IN PROJECTION IN THE OPAQUE PROJECTOR.

Pictures for use in the opaque projector can be mounted on cardboard for more permanent use and reference. In mounting pictures, it is recommended that a dark, nonreflecting cardboard be used to eliminate distracting reflection or glare on the screen. Do not use rubber cement to mount these pictures because the heat from the projector will cause them to come loose from such mounting.

After pictures have been mounted and classified, they should be filed in standard letter files or in other types of storage where they can be immediately located. Some teachers write pertinent information on the backs of the mountings for reference purposes. (See Chapter 5.)

Pictures are not the only materials that are of value when the opaque projector is to be used. The students' own drawings, sketches, written materials, and problems can also be used. Think of the thrill a kindergarten child would experience in seeing his own picture projected and in being able to describe its content. Upper elementary students enjoy using the opaque projector for such subjects as science, social studies, art, music, literature, and language arts. Junior and senior high school students find the opaque projector of great value in supplementing class reports with their own drawings, charts, and diagrams.

When children know that the themes they write and the drawings they make are to be projected for inspection by the entire class, greater care is used in preparing assignments.

The opaque projector is also valuable to the instructor who finds an important reference book. If only one copy is available, the book can be used for the whole class. Special types of rollers are made to enable pictures to be turned through the projector. This saves presentation time and develops a more uniform method of placing the material in the equipment. An entire series of pictures may be presented when fastened together with tape and pulled or rolled over the platen. The teacher will soon develop new techniques for improving his use of the opaque projector, once he has found the many advantages of this equipment. Teachers appreciate the immediacy of this equipment to meet today's problems. They need not worry about ordering material, the lag in time of delivery, and other complications connected with the procurement of most other types of projected materials. If an opaque projector is available, the visual lesson can be as extensive as the imagination of the teacher and the pupils.

4. Locate five magazines in your own or a related subject field. Look through these magazines carefully to see how many pictures or illustrations there are that you could use with the opaque projector. List the magazines and the number of pictures you found.

Magazine	*Number*
a.	a.
b.	b.
c.	c.
d.	d.
e.	e.

5. Project: Start a picture file of good pictures and illustrations that you find in magazines and newspapers. Such a file will be invaluable when you have access to an opaque projector. Files are always useful for bulletin boards and other projects. Plan a method of indexing and cataloging your pictures.

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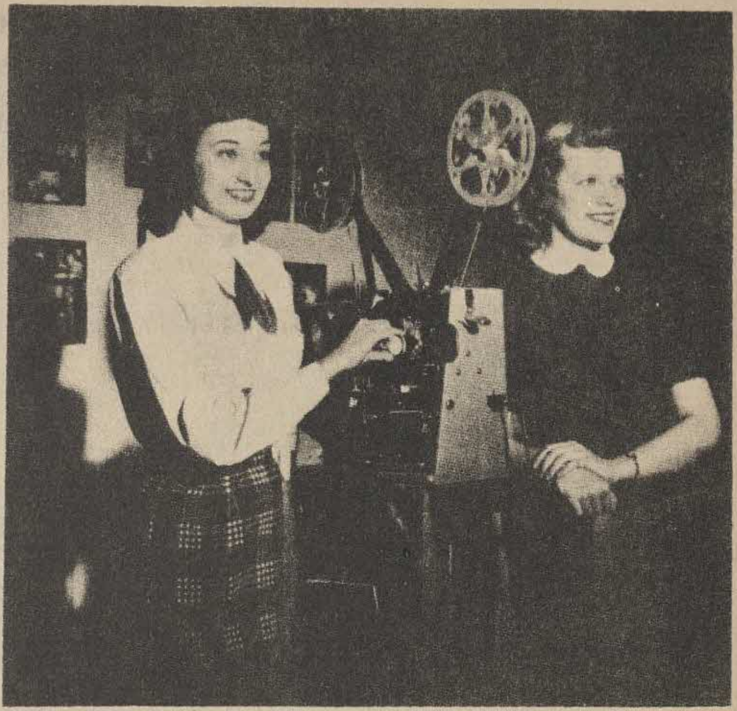

Iowa State Teachers College

19

MOTION PICTURES AND MOTION PICTURE PROJECTORS

TO UNDERSTAND the educational film, a teacher must first understand the potentialities of the motion picture and what it can do to change attitudes or influence people. Each of the various audio-visual devices has some peculiar advantage that makes it more effective in a particular learning or teaching situation. The motion picture has many advantages and, for this reason, it is one of the most widely used instructional devices.

What Makes the Motion Picture Effective?

What are the characteristics of the motion picture that make it a powerful means of communication? First, as the name implies, it has motion.

Motion

If motion is important in the learning or training process, the motion picture may be the answer. Motion is not always necessary in teaching, but if it contributes to the learning process, it can be provided through this medium. Through the eyes of the motion picture camera, it can show the many movements of animals, people, and machines. We can see close-up pictures of the hands performing a variety of tasks, as in the teaching of handicrafts or in repairing or assembling certain equipment. Motion often gives us the reality necessary for the "how to do it" type of teaching.

No doubt most people understand that, actually, one does not see motion while viewing a motion picture. The film is only a series of still pictures, photographed at a predetermined number of frames per second. When film is projected through the 16mm. sound motion picture projector at 24 frames per second, the persistence of vision in the human eye gives the illusion of motion.

1. List three ways in which motion would be important in teaching subjects in your major field.
   a.

   b.

   c.

Slow Motion

Slow motion, in motion picture photography, gives the instructor the advantage of slowing down a fast-moving object so it can be studied. Some teachers have the idea that any film can be projected in slow motion; however, this is incorrect. To enable the teacher to project a film in slow motion, it must be photographed at a much faster rate of speed. Most 16mm. motion picture cameras have an adjustment that will allow pictures to be photographed at speeds of 8, 16, 24, 32, 48, or 65 frames per second. The faster the picture is photographed, the slower the motion will appear on the screen when the film is projected at normal speed. The normal speed for 16mm. sound projectors is 24 frames per second. Special types of motion picture cameras are available that will photograph at speeds of 128 frames per second; they are often used in photographing such things as the swing of a golf club, the batting of a baseball, machine operations, or other fast moving objects. Certain industrial organizations and military research groups have developed cameras that will take motion pictures at extreme speeds of thousands of individual frames per second. These films assist in the study of machines and of ordnance problems of importance to the government.

2. There are 40 frames in each foot of 16mm. motion picture film. If you were to photograph an object at 64 frames per second, how many seconds of pictures could you take on a 100-foot reel of film? __________

3. If you were to photograph the same scene at 24 frames per second, how many seconds of pictures could you take on a 100-foot reel of film? ____

Fast Motion

In the making of motion pictures, it is often desirable to have the action move faster than normal on the screen. In such cases, the camera is slowed down. Instead of setting the camera for 24 frames per second, the standard speed for 16mm. sound film, the camera is slowed to 8 or 16 frames per second. When photographed at 8 frames per second, the movement will project at two-thirds faster than the normal 24 frame speed. When taken at 16 frames per second, movement will be one-third faster. A person walking at a normal rate of speed appears to be moving much faster during projection, if photographed at one of the slower camera speeds. One of the uses for fast motion in a motion picture film is for trick photography or humorous effects. Slower camera speeds may also be used in situations where adequate light is not available for photography at normal speeds.

Bell & Howell Company

JOHN OTT, JR., AT WORK ON ONE OF HIS FAMOUS TIME-LAPSE FILMS. CAMERAS AND LIGHTS ARE AUTOMATICALLY CONTROLLED FOR INTERVAL FILMING OPERATION.

Time-Lapse Photography

Time-lapse photography is used to record the growth of plants or other movements of things that are too slow to be perceived by the human eye. In time-lapse photography, a plant can be photographed with exposures of one or two frames at any specified interval, perhaps every one or two hours over a period of months. A special timing device is used that will turn on the necessary light and expose the film for the desired number of frames. With this mechanism, plants can be observed through their entire life cycles, from the germination of seed to the forming of the flower. This is a technique that can be performed only with the motion picture camera. Pictures photographed by time-lapse methods are projected at the regular rate of 24 frames per second on any 16mm. sound motion picture projector.

4. If you ordered an 800-foot sound film for use in your class, how much time would you allow for the showing?

Stop-Motion

In addition to the possibility of utilizing motion, slow motion, fast motion, and time-lapse photography, it is also possible to use stop-motion (often called frozen motion) in certain places in motion pictures. The

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stop-motion technique is used to show a prolonged series of the same frame of some special action that is important to the film content. If it is considered desirable, any film can be made to have stop-motion. The method of producing this type of scene is to reprint one single frame for as many times as desired to give the students an opportunity for studying the technique being shown. The action then may be allowed to go on to complete the cycle. This technique is used in demonstrating such sports as tennis, badminton, golf, and other games with fast action.

Dramatization

Dramatization is an important characteristic of the educational motion picture. Some subjects can be presented in a factual manner. The "how to do it" film is one of these. Historical, documentary, and promotional types of education films will also be improved greatly if dramatized. In the dramatized film, the student places himself in the role of the leading character to the extent that he "relives" the event being shown. In many instances, this creates an outstanding learning environment that cannot be gained in any other way. You could hardly compare a reading assignment containing a series of facts about the life of Patrick Henry with a dramatized film showing an actor giving his stirring speech in "Give Me Liberty." Although students know that the person playing the part is only an actor, there is a great feeling of reality built into the dramatic film. The re-creation of reality in the mind of the student establishes a good background for remembering.

If the proper emotional background has been presented in the dramatized film, the student becomes a part of the film world he is seeing and will long remember the important scenes. For this reason, it is very important that the films shown in the classroom be authentic and carry true impressions and concepts. It is just as easy to remember a false concept or dramatization shown in a film as it is to remember a correct one. The instructor must also be aware of the propaganda film that has been made to sell a certain segment of people on a certain way of life, or on particular commodities. The propaganda film is not dangerous if its purposes are known and discussed prior to the showing, or if it is being used to study methods of propaganda.

5. In what way would dramatization be important to films in your subject field? (Explain.)

6. List three educational films that you consider greatly improved by the use of dramatization.
   a.
   b.
   c.

Los Angeles Public Schools

THE STUDENT BECOMES A PART OF THE FILM WORLD HE IS SEEING.

Animation

In your studies, you have often wanted to look inside of a machine or other object, or view it in cross-section. In other instances, you may have wanted to take a large operation, such as a manufacturing plant, and simplify it for basic instructional purposes. Many of the things that are impossible to photograph otherwise can be shown with animation built into the educational motion picture. It is impossible to see how sound is recorded on a magnetic tape recorder because sound is invisible. By means of animation and the motion picture camera, the sound patterns can be simulated and a film made to explain the way sound is recorded on an iron oxide surface. The students will then better understand this invisible process. Another example of the role of animation would be a representation of the operations of an oil refinery. Because of the many complicated types of vats, pressure systems, and machinery, it would probably take days for a class to study and understand the operations of a large refinery. With motion picture animation, the less important operations can be eliminated and only the important phases shown in cross-section. These might include the movement of the different products through the many stages of the refining process. To supplement scenes in an educational motion picture that are hard to understand or impossible to photograph in any other way, animation can be of great use.

Animation is used in many educational motion pictures, but it is often kept to a minimum number of scenes due to the high production cost involved. The animation of a motion picture makes it necessary to produce hundreds of carefully prepared drawings and overlays. The expense of preparing this material makes it necessary to keep animation sequences to a minimum, or in some instances to eliminate them entirely. To keep the cost low, some producers of educational films have developed a technique of simplified animation that represents a much smaller amount of art work and can be produced for a fraction of the cost of complete animation.

7. **Explain how motion pictures are animated.**

8. **In your own subject field, list three units of study that would be improved if animated in motion picture form.**

a.

b.

c.

Photomicrography

Photomicrography provides the means of presenting on the screen enlarged, projected pictures of microscopic objects in motion. Many objects too small to be seen by the unaided eye can be photographed through a microscope with a motion picture camera and thus greatly enlarged for study. Blood in motion through the veins of a frog's foot, cell division, and many other important microscopic scenes can be projected to a size of 8′ x 10′ or larger for study purposes.

When microscopic objects are projected on the screen, the subject can be discussed intelligently because the entire class sees the same thing. Photomicrography plays an important part in bringing the "invisible" world of nature to the classroom.

Sound

Studies of the educational motion picture indicate that in a motion picture the visual, as opposed to the auditory, impact should be the first consideration in the selection of an educational motion picture. Does it tell a visual story? Of course, commentary or narration on the film is important and fills gaps that cannot be presented visually. Not only is the spoken word important, but music and other recognizable sounds make the film a "living experience." Research has also shown that too much sound on films is often distracting and may interfere with the visual impact. Of course, the musical or dramatic film would be of little value without mood music or the spoken lines of the characters being depicted.

The development of 16mm. sound motion pictures in the early 1930's gave the film producer another means of providing emphasis to the narrated educational motion picture as well as life and reality to dramatic and musical films. We live in a world of sounds, and sound is important in the learning process; however, the visual story should be most prominent in our instructional films.

Color

During the past ten years, color has contributed much to the educational motion picture. Students, for the first time, could see various scenes in natural color. Many of our educational films are now available in color, and others are being produced weekly. However, color films are much more expensive to produce, and print costs are about double those for black and white productions.

Research has shown that unless color is important to the particular subject, students will learn just as much from the same film in black and white. Considerable thought should be given to the question of color when selecting educational films.

In some of the professional fields, such as medicine and dentistry, color is necessary to show healthy skin texture in relation to diseased areas. In home economics, it would be difficult to teach good color contrasts without the use of color. Yet, in many subjects, color is not important, and the black and white film will be just as effective.

The Educational Film

Some of the characteristics that make the educational motion picture a powerful means of communication have been explained. In the more successful educational films we may find a combination of all of the different photographic possibilities such as slow-motion, stop-motion, animation, dramatization, and effective sound. Such combinations make a film a real learning experience.

The inexperienced teacher often thinks of the educational film as a cure-all, or as an answer to all problems. First, the teacher must realize that there are many different types of educational film. Secondly, each film is designed to meet a specific purpose. In most instances, the educational film is produced to do a specific job. In evaluating and selecting films, the teacher must recognize the type of film and then analyze it in relation to the original purpose. Films have been classified in many different ways. The following classification should help teachers evaluate films and to determine the specific purpose of each:

A. Historical films	Give background and knowledge of historical events, usually dramatized.
B. Documentary films	Document the living scene or story and present, in the definition given by John Grierson, one of the originators of documentary films, "a creative treatment of actuality."

C. How-to-do-it films	Show how to operate a machine, how to work a problem, and include many other types of technical films showing "how-to-do-it."
D. Scientific films	Depict scientific theory, theory of flight, theory of astronomy, atomic theory, and similar scientific subjects.
E. Appreciation films	Teach an appreciation of art, music, literature, a way of life, etc.
F. Personal and social adjustment films	Present situations involving personal and social adjustments for the elementary, secondary, and college student; often of a discussional nature.
G. Informational films	Create a general understanding or give background to a certain subject. In general, films cover such subjects as geography, interesting places, and travel. They are often valuable to give background to a unit of study, or to provide reality by bringing other parts of the world into the classroom.
H. Guidance films	Show everyday life adjustment situations; including films on trades, occupations, or professions. Such films are often used to create group discussion.
I. Pacing or drill films	Improve reading or musical instrument skills. Such films are used primarily to improve reading speed or sight reading in music. Only a few films have been developed, usually in series; however, other films of this type will no doubt be produced in the near future.
J. Story-telling films	Create interest in story-telling and reading, usually at the kindergarten and lower elementary school level.
K. Recreational films	Provide entertainment in the form of sports films, comedies, or the feature film showing in the auditorium, but not for any specific instructional objective. In most cases the recreational program should be kept distinctly separate from the classroom instructional motion picture program.
L. Industrial or promotional films	Advertise a product being shown in the film, and promote sales indirectly. Great care should be used in selecting the industrial film to prevent direct advertising in the school. Many industrial films are beautifully produced, and some have made a contribution to the educational programs of schools.
M. Propaganda films	Emphasize a particular doctrine or selection of information for pressure groups or government. This type of film must be used with great care in the schools, and complete information must be given as to its purpose, producer, etc.
N. News and current events films	Provide news on current events. This type of film has only recently been made available to schools. Similar films of current news events will probably be valuable in classrooms in the future.
O. Professional films	Provide film material for specific professional uses, such as medicine, dentistry, engineering, and others. Films of this nature are usually quite advanced and are used by professional schools for refresher courses or by professional societies.
P. Course series films	Provide an entire series of films for the complete course. In most cases such series provide a film for each day. This type of film is in an experimental stage at present, primarily in the sciences.

9. Study an educational film catalog or directory and select two films in each of the fifteen preceding film classifications. (List here.)

Bell & Howell Company

MOTION PICTURES SHOULD BE SHOWN IN THE CLASSROOM IF POSSIBLE.

10. List two educational film directories (not catalogs) and the sources from which they may be obtained.

a.

b.

Selecting the Right Film

The first important step is to select those films you think will contribute to the unit of instruction or course of study. Use directories and catalogs that list the educational films available in your state or area. Select subjects that will make the greatest contribution to the difficult areas of your course or units.

Previewing the Films

Be sure to preview each film before using it in your classroom. Titles of educational films are often misleading. The only way a teacher can be sure the film meets the objectives of the unit is by previewing and studying the film. In the larger schools, viewing of films prior to purchase is often done by specialists in subject matter and curriculum. This kind of previewing does not take the place of the individual teacher's preview of the film before use in the classroom Keep records of all previews so the educational films selected can be integrated into your course of study.

Evaluating the Film

There are two essential criteria for judgment of the effectiveness of educational motion pictures.

A. Effectiveness based on the teacher's observation, testing, and over-all contribution to the unit.
B. Student evaluation of the film based on like and dislike, apparent motivation to do further study and reading, questions related to the film presentation, and discussion.

Every teacher should have an evaluation card or form to record important data related to the effectiveness of filmed material. It is desirable to have a standard form used by all teachers, in the same school, so that permanent records can be kept of the films and other instructional materials used. A program of instructional materials evaluation is not a "one time job," but must be a continuing process, taking into consideration new films and materials that are produced each year and eliminating the old, out-dated materials.

A school audio-visual evaluation program is not only a problem of the individual classroom teacher but also one for the school administrator. Plans should be developed for standard evaluation forms, appointment of evaluation committees, and correlation of the information from all sources in the planned program of the school. A strong teacher-student evaluation plan must be organized from the top school administrator, through committees, to the individual classroom teacher.

STATE INSTITUTE OF EDUCATION
Govt. of West Bengal

Suggested Evaluation Form

AUDIO-VISUAL MATERIAL EVALUATION FORM[1]

(Circle) Film, Filmstrip, Slide, Recording, Map, Model, Chart, Other ______
Title ______ Reviewed by ______ Date ______
Description: (as apply) Color ______ Time ______ Pages ______ Size ______ Copyright date ______
Rental Price ______ Rental Source ______
Purchase Price ______ Purchase Source ______
Use date: Grade ______ Unit of Study ______
Is the content valid, correct, and truthful? Yes ______ No ______
Does this audio-visual material add additional desirable information to a given course or use, which is above and beyond what you can now accomplish with materials currently used in this situation? Yes ______
No ______ If "yes," what?
Evaluation:
Photography or format: Excellent ______ Good ______ Poor ______
Sound: Excellent ______ Good ______ Poor ______
Teacher's guide or manual: Excellent ______ Good ______ Poor ______
Content: Superficial ______ Too Detailed ______ Well Balanced ______
Organization and continuity: Excellent ______ Good ______ Poor ______
Vocabulary: Excellent ______ Good ______ Poor ______
Authenticity: Acceptable ______ Nonacceptable ______
Advertising: Excessive ______ Acceptable ______ None ______
General rating: Excellent ______ Good ______ Poor ______
Recommendation for future use: Yes ______ No ______ ______ Reason:

---

[1] Walter A. Wittich, Audio-Visual Material Evaluation Form. Madison: University of Wisconsin, 1948.

Content: (Brief description of audio-visual material)

11. Select, from directories or catalogs, a list of ten films which would be of value in teaching a course in your own subject field. (Use local catalog listing films available if possible. See 12 below.)

a.

b.

c.

d.

e.

f.

g.

h.

i.

j.

12. Project: Preview the above ten films and fill out an evaluation form on each.

Study Guides

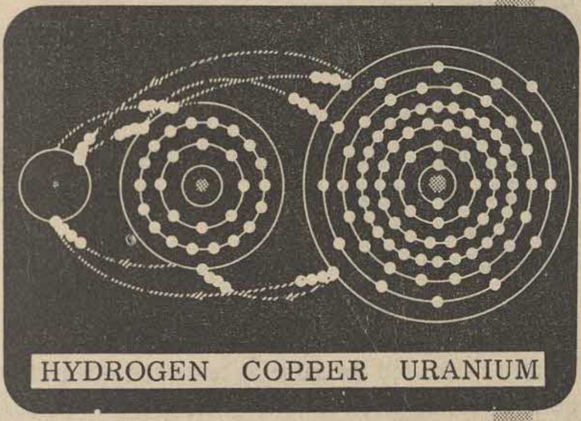
Most educational films have printed study guides accompanying the film to assist the teacher in organizing the lesson. Check on the availability of study guides before you start your previews. The guides will often help you by providing pertinent information regarding the film content and suggestions concerning related projects for further class study.

Using the Educational Film

A. Arrange for the showing of the film in advance.
  (1) Is the motion picture projector in operating condition?
  Is there an extra projection bulb available? Is the projector clean?
  (2) Can your classroom be darkened adequately so that all the children can see the projected picture? Can the classroom be ventilated while the room is darkened?
  (3) Are all the seats in the classroom within a good viewing angle of the screen?
B. Prepare the students to see the film.
  (1) Discuss the subject being studied. Find out what the students know and do not know about the subject.
  (2) Discuss with the students what you expect them to get from the film.
  (3) Prepare the students for any special vocabulary or new words.
  (4) Inform the students that they will be held accountable for information in the motion picture, just as they would for textual information.

Encyclopaedia Britannica Films

FILM GUIDE



No. 765

WHAT IS ELECTRICITY?

A BLACK-and-WHITE FILM
16MM., SOUND, 13 MINUTES

From the Educational Library of
British Electrical Development Association

A Merton Park Production

Special Consultant
O. W. ESHBACH, D.Sc.
Northwestern University

STORY OF THE FILM

WHAT IS ELECTRICITY? is designed for the beginner in **physics** at the **senior high school** level, as well as for the **general science** student. Since about half of the film deals with atomic concepts, the film will also be useful in beginning **chemistry.** The practical importance of the film's content and the appeal of its subject matter will make it a welcome contribution to **adult education** and **teacher training** classes.

ELECTRICAL CHARGE

The film opens with a brief historical introduction, showing interesting natural phenomena — a thunderstorm, the strange appearance of St. Elmo's fire in the rigging of a ship, and the Northern Lights. Following this motivational material, the classical electrostatic experiments are presented. In Du Fay's experiments, early in the 18th century, we see evidence of two kinds of electricity; one results from rubbing amber and other resins with fur, and the other by rubbing glass with silk. Benjamin Franklin's daring and ingenious experiment with a kite in a thunderstorm is recreated. Various methods of producing electrical charges introduce the idea of electric currents as moving charges. We learn that Volta's experiments with an electroscope established the identity of moving charges — and we see how he created the first battery by putting disks of two different metals, copper and zinc, into cups of salt water and then connecting them together, one after the other.

ELECTROMAGNETISM

The next sequence provides a visual account of electromagnetism. Oersted's experiment with an electric battery and compass shows that an electric current produces a magnetic field. Faraday's experiment reverses this process by moving a magnet through a coil of wire. Instruments show that a flow of electric current results. These are the discoveries that have led to the development of the modern generator. In a series of scenes showing industrial applications such as motors and generators, the film illustrates some of the achievements of our civilization.

NATURE OF ELECTRICITY

The investigations demonstrated in this film provide a background for considering the nature of electricity and its correlation with atomic theory. Developed by a scientist named Dalton in the early 19th Century, the atomic theory has been expanded by other scientists. Today we know nearly 100 different elements, which have been arranged in the periodic table. A series of diagrams explains the organization of atoms, from the simplest and lightest, hydrogen, to the heavier and more complicated atoms such as uranium. Then we see a dramatic demonstration of the flow of electricity in metals, resulting from the movement of electrons. It is this movement of electrons which produces the electricity that men use in their daily lives.

C. Show the motion picture.
  (1) Make the showing of films and other visual materials a part of the regular classroom presentation, *not a special feature.*
  (2) Show the motion picture in your own classroom if possible.

D. Discuss the film immediately following the showing.
  (1) Through discussion, you will discover whether there are questions that remain unanswered.
  (2) Through discussion, certain projects may be suggested, or students may be stimulated to do additional reading.
  (3) Take every advantage of the interest stimulated by the visual presentation.
  (4) Through discussion, you may find that there is a need to show parts of the film a second time. Research has indicated that a second showing of a film is often very useful.

E. Projects may grow out of film interest.
  (1) The showing of an educational motion picture often will stimulate or motivate students to investigate further the things shown in the film. The alert teacher will stimulate the students' thinking toward possible projects related to the visual presentation.
  (2) Projects growing out of film studies might include such things as field trips, bulletin boards, picture books, making of models, or collection of objects.

F. Test the film content.

If the film is to be effective in the classroom, it must be treated the same as texts and other classroom tools. It is not recommended that a quiz or test be given following the showing of *each* educational motion picture, but it is recommended that questions from the films used be included in weekly or unit examinations. If students find they are not held accountable for materials presented in the film, they will often view the films in a passive manner.

Motion Picture Projectors

Many important changes have been made in the 16mm. motion picture projector since it was first developed in 1925. The modern 16mm. sound motion picture projector, designed for use in the classroom, often has the speaker built into the case, making it a one-unit machine. This lightweight, single-case machine is favored by most schools if it is to be moved from classroom to classroom for many different showings each day. The other type of equipment is the larger, two-case machine for use in auditoriums or larger classrooms. In the two-case type of equipment, the speaker is larger, usually 10 or 12 inch size. The amplifier is also larger to provide satisfactory sound in bigger rooms.

Set Up Projector and Operate

Teachers should be able to operate and perform simple maintenance on the motion picture projector. Following the operator's progress chart, check off the different operations as you complete them: use operator's progress chart page _____.

Suggested projector care is as follows:

Clean the lenses with great care. Use lens tissue and special lens cleaning fluid.

Clean the film gate and film path daily. Use only a brush or lint-free cloth. If dirt particles stick to the film gate, remove with wood or bone scrapers—never use metal objects to scrape the film gate or aperture plate. The metal might scratch the aperture plate, causing scratches and damage to films when they are projected.

Oil the projector at intervals specified by the manufacturer. Follow the recommendations in the manufacturer's manual. One person should be placed in charge of oiling all projection equipment. Oiling dates should be recorded; projectors can be damaged by excessive as well as insufficient oiling.

PROPER INSPECTION AND REPAIR ARE IMPORTANT IN EVERY FILM LIBRARY.

San Diego City Schools

FILMS ARE CATALOGUED AND STORED FOR EASY ACCESS.

San Diego City Schools

Film Care and Inspection

Films are valuable material and should be handled with great care. If a film is broken during projection, it is important to salvage all the film. Don't use paper clips or pins to fasten the broken ends together, as they could be dangerous to the person inspecting the film. Either over-lap the film on the takeup reel, or use cellophane tape as a temporary means of fastening the ends together. Be sure to repair the film prior to the next showing. A good film splicer and fresh film cement should always be available for splicing. If a film is repaired immediately after it is broken, the damage of many feet of film may be avoided.

Dirt and dust on films will soon cause considerable scratching of the emulsion. Such scratches will eventually make the film unserviceable. Film can be cleaned with film cleaning fluid and a soft, lint-free cloth. Dampen the cloth with the cleaner and draw the film over it.

13. What do the following speeds represent in the operation of a 16mm. motion picture projector?

a. 16 frames per second ______________________________

b. 24 frames per second ______________________________

14. What is the purpose of the exciter lamp in the sound motion picture projector?

15. What is the purpose of the photoelectric cell in the sound motion picture projector?

16. How can the illusion of slow motion be acquired while a film is being projected?

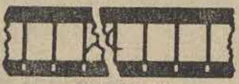
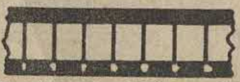
17. What is the focal length of the objective lens on the projector you were trained to operate?

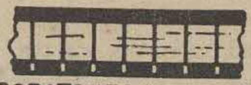
18. Suggest two ways by which a projected picture could be reduced in size to fit its screen.

a.

b.

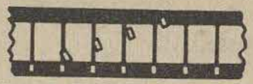
Types of Film Damage

	WHAT TO DO
 BREAKS	Splice the film. For temporary purposes, over-lap the film on the takeup reel.
 TORN SPROCKETS	Remove the torn sprocket holes by cutting and splicing. Find the cause of torn sprockets by checking the projector.
 ENLARGED SPROCKETS	If film will not project, remove torn holes by cutting and splicing. Check the cause of damage to film on the projector.



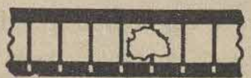
SCRATCHES ON FILM

Clean the projector thoroughly. Dirt in aperture is the usual cause of scratched film.



DAMAGE TO SOUND TRACK

If sprocket punches appear on the sound track it has been threaded wrong in the projector.



BURNS ON FILM

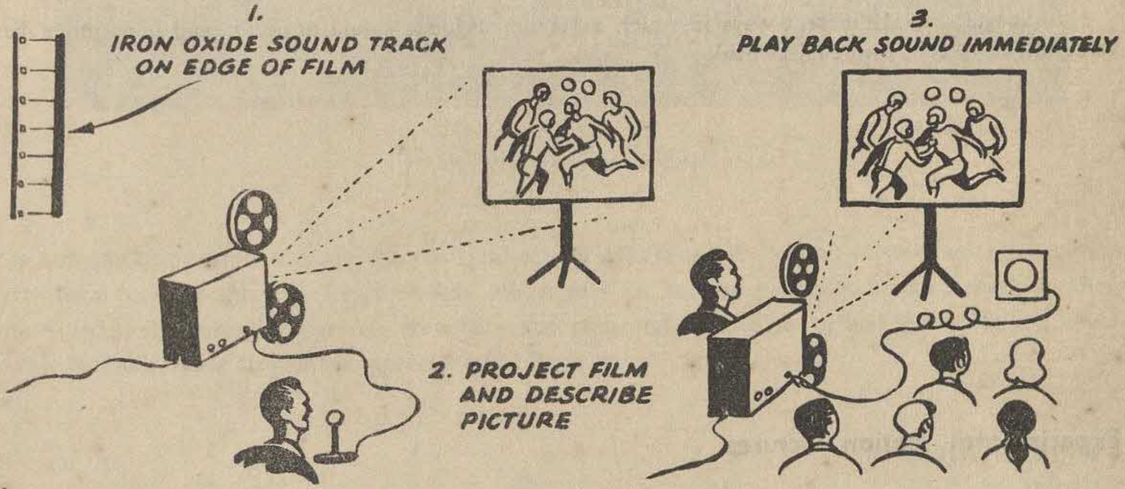
Cut out the burned section and splice. Burns are often caused by improper operation of the projector's fire gate.

19. Inspect an old film for damage. List the types of damage found.

a.

b.

c.


1.
IRON OXIDE SOUND TRACK ON EDGE OF FILM
2. PROJECT FILM AND DESCRIBE PICTURE
3.
PLAY BACK SOUND IMMEDIATELY

TEACHERS AND STUDENTS CAN RECORD THEIR OWN SOUND TRACK ON FILMS WITH MAGNETIC TYPE OF MOTION PICTURE PROJECTOR.

20. Splice a 16mm. sound film. Test it to be sure the splice is satisfactory. (Staple your spliced film in the space below.)

Magnetic Sound Track

Developments in magnetic sound recording following World War II resulted in a magnetic sound track that can be added to a 16mm. sound motion picture film. A strip of magnetic tape can be applied to the entire width of the sound track or, if desired, to only half the width of the track. This latter system allows for the use of both the existing optical sound track and the magnetic track. With this system schools can now make their own sound films.

Several different combinations of magnetic and optical 16mm. sound projectors are available. With such a projector and a microphone, any teacher can put sound on a 16mm. film. One procedure for making a magnetic sound track is as follows:

A. Photograph the 16mm. motion picture, and have the film processed.
B. Edit the film to the desired length and sequence.
C. Have a processing laboratory apply a magnetic sound track to the film.
D. Using a 16mm. magnetic sound projector and microphone, record the desired sounds on the film.
E. By a simple change of the controls on the projector, you can project the picture back immediately with your own sound track.

Magnetic 16mm. sound projectors will reproduce both magnetic and optical sound tracks. The latter form is printed on the film by optical recording equipment and is then developed photographically along with the picture. The sound is permanent on the film. With a magnetic sound track, you can change the sound on the film at any time desired by erasure and recording of a new track.

It is suggested that if you plan to use magnetic sound tracks on educational films that have been produced and copyrighted by another person, you should be sure to obtain permission to do so from the producer or from the copyright holder.

21. Indicate several different ways in which a 16mm. magnetic sound projector and films might be of value to you in your own subject field.

a.

b.

c.

Experimental Motion Pictures

The motion picture has been an important research tool for many years. Many industries use the motion picture to photograph specific operations and then study the films to improve work methods. The equipment used for photographing and projecting research films for study or analysis purposes is highly specialized. Many industries now make motion pictures to analyze motion and time study problems relating to different jobs. The film is then studied frame by frame to chart every movement a worker makes in doing a certain operation. The results of such studies are often used in developing a new and easier way of doing the job. Experimental motion pictures are also used in medicine and similar professions to record operative or treatment techniques for later study and reference.

New Techniques in Educational Films

Thousands of educational motion pictures are now available, and new films are being released daily. Within the past few years, the producers of educational motion pictures have introduced many new techniques. The schools are receiving more discussion and provocative films. The producers of educational films are trying in every way possible to make better films for the schools of America.

State University of Iowa

PRODUCING AN EDUCATIONAL FILM.

It is now the responsibility of the teachers and school administrators to find ways of utilizing motion pictures to their best advantage. Research has shown that the motion picture can make many unique contributions to the educational program. Teachers must constantly be evaluating and testing these instructional materials if children are to gain the greatest good from them.

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Films:

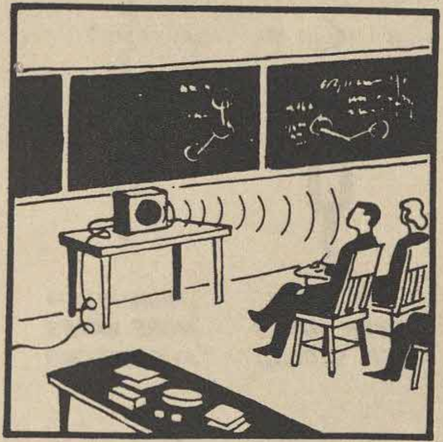
"Audio-Visual Materials in Teaching," 13½ min., sd., b&w, or color, Coronet Films, 1956.
"Film Research and Learning," 14 min., sd., b&w, International Film Bureau, 1959.
"Instructional Films—The New Way to Greater Education," 27 min., sd., b&w, Coronet Films, 1948.
"Let's Talk About Films," 18 min., sd., b&w, National Film Board of Canada, New York, 1953.
"Making Films That Teach," 22 min., sd., b&w, Encyclopaedia Britannica Films, 1954.
"New Tools for Learning," 19 min., sd., b&w, Encyclopaedia Britannica Films, 1952.
"Operation and Care of the Ampro Super Stylist Projectors," 21 min., sd., b&w, International Film Bureau, 1956.
"Operation and Care of the Bell and Howell Sound Projector," 2nd ed., 11 min., sd., b&w, International Film Bureau, 1957.
"Operation and Care of the DeVrylite Sound Projector," 18 min., b&w, sd., International Film Bureau, 1953.
"Operation and Care of the Victor Sound Projector," 11 min., b&w, sd., International Film Bureau, 1954.
"Sight and Sound," 11 min., sd., b&w, National Film Board of Canada, New York, 1949.
"Using the Classroom Film," 22 min., sd., b&w, Encyclopaedia Britannica Films, 1945.

Filmstrips:

"Film Inspection," 34 frames, si., b&w, State College of Washington, 1954.
"Films Serve the Community," 54 frames, si., b&w, Canadian National Film Board, 1948.
"How to Use a Teaching Film," 38 frames, si., color, Basic Skills Films, 1957.

UNIT FOUR

AUDIO MATERIALS AND EQUIPMENT INCLUDING TELEVISION



20

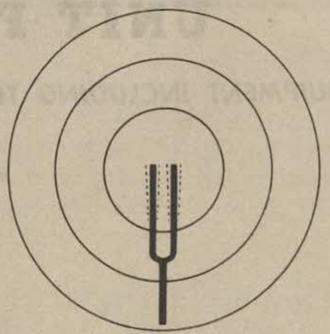
PRINCIPLES OF SOUND

SOUNDS ARE threads that are woven into all phases of the fabric of living. Without sounds, we would have no speech, no music, no audible warning of danger, and, indeed, the lack of sound would make the world a drab place in which to live. We have always counted on sound to convey to us a large part of our education. With such developments as television, radio, telephone, telegraph, and records, we must, as never before, understand how sound is produced, transmitted, recorded, reproduced, and heard. It is not necessary for the teacher to become a master of electronics, but the basic principles of sound should be understood in order that the most effective use may be made of the modern audio tools of communication.

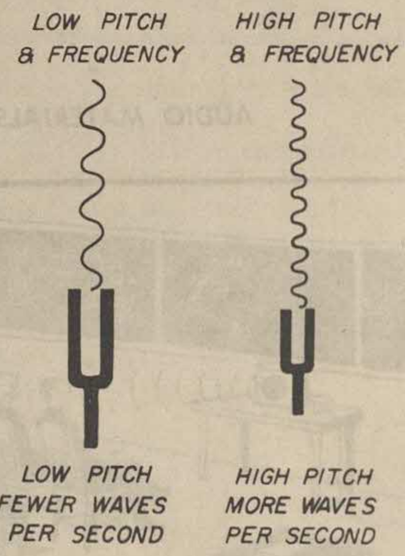
1. In what ways has audio communication become more important in modern education? (Explain briefly.)

What Is Sound?

Any sound, anywhere, regardless of its loudness or softness, has its origin in the vibration of something. A knock on the door actually vibrates the wood. The pluck of a tight rubber band vibrates the rubber. Without such vibrations, there would be no sound.



SOUND WAVES FROM A TUNING FORK SPREAD IN ALL DIRECTIONS. THESE WAVES CONSIST OF COMPRESSIONS AND RAREFACTIONS OF AIR IN RAPID SUCCESSION IN DIRECT RATIO TO THE VIBRATING OBJECT.


LOW PITCH & FREQUENCY
HIGH PITCH & FREQUENCY
LOW PITCH FEWER WAVES PER SECOND
HIGH PITCH MORE WAVES PER SECOND

But vibrations alone are not enough; some type of material such as air, water, metal, or wood is needed to transmit sound. The more "solid" the material is, the better it will conduct or transmit sound. Lightly compact materials, such as cloth and perforated building materials, are poor conductors of sound and are often used as sound-deadening materials.

2. Explain how a person, by putting an ear on the rail, can hear the sound of an approaching train long before it can be seen.

3. Some classrooms have such an echo that teachers can almost hear themselves think. How can this situation be overcome?

4. Can you give a good definition of the word *sound*?

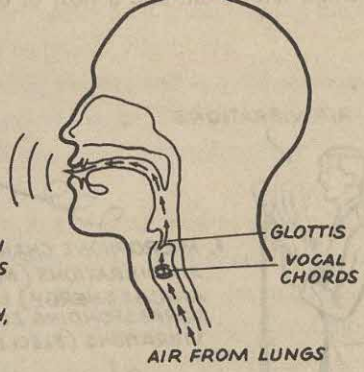
Any material that transmits sounds can carry many different vibrations of various frequencies at the same time. This is a principle that makes music possible. For example, a large ocean wave may be fifty feet between crests. A motor boat traveling over these crests may make waves only five feet between crests, and a breeze may disturb the surface of the ocean simultaneously. All of these may be carried by the water at the same time. Sounds are carried in the air in the same manner.

Noise differs from music in one major respect. Noise is composed of sounds of such a short duration, or of such a complex structure, that they cannot be understood or analyzed by the ear.

How We Produce Sounds

The voice is man's most important sound producer. We must learn how to control our voice mechanisms in order to communicate effectively with our fellow men. Speaking is an art that must be learned. We don't learn to talk by accident.

Human sounds, both pleasant and unpleasant, are produced by vocal cords which vibrate when air passes between them.



AIR FORCED FROM THE LUNGS THROUGH THE GLOTTIS CAUSES THE VOCAL CHORDS TO VIBRATE. THESE VIBRATIONS IN TURN PRODUCE SOUND WAVES WHICH, WHEN CONTROLLED, FORM SPEECH PATTERNS.

Air spaces in the chest, nose, throat, mouth, and head are resonating air columns which amplify and change the quality of sounds and also give each individual voice a special character. Variety and quality changes of sounds can be produced by changing the position of the tongue, lips, and cheeks.

The human voice is our most important instrument of communication. Too often, little time and effort are spent improving the use of this instrument. We forget that we can improve the quality of verbal communication if we control our voices, enunciate clearly, speak slowly in a low pitch, and eliminate unpleasant nasal twang.

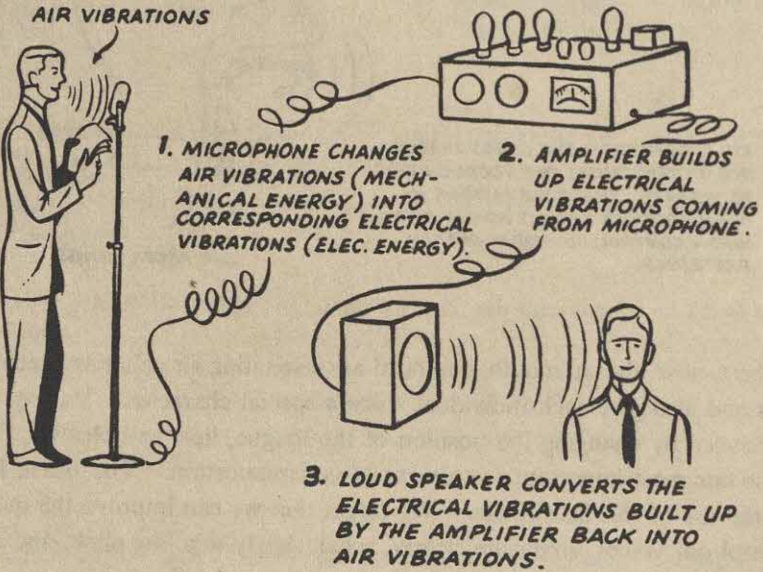
5. Why do children have voices of different pitch than those of adults?

6. Can you explain why the voice is called the most perfect sound producing instrument?

7. How can you improve the quality of your own voice?

How We Transmit Sound

As we have seen, sound is nothing but vibrations that come from a vibrating object. In transmitting sound with the human voice, the vocal cords vibrate, sending out sound waves into the air. For centuries, man has tried to increase the range of the human voice so that communications could be sent over great distances. This development had to wait until the discovery and control of electricity. Thomas Edison, using the knowledge of preceding scientists, developed equipment that has changed the entire picture of communications and, in turn, has greatly affected modern living. Edison's experiments provided the means by which air vibrations (mechanical energy) could be changed into electrical vibrations (electrical energy). These electrical vibrations, when amplified or built up, could then be converted back into air vibrations (mechanical energy). This has made possible the development and use of public address systems, radio, telegraph, sound motion pictures, recordings, television, and a host of other media of audio communication.


AIR VIBRATIONS
1. MICROPHONE CHANGES AIR VIBRATIONS (MECHANICAL ENERGY) INTO CORRESPONDING ELECTRICAL VIBRATIONS (ELEC. ENERGY).
2. AMPLIFIER BUILDS UP ELECTRICAL VIBRATIONS COMING FROM MICROPHONE.
3. LOUD SPEAKER CONVERTS THE ELECTRICAL VIBRATIONS BUILT UP BY THE AMPLIFIER BACK INTO AIR VIBRATIONS.

All audio equipment, regardless of its purpose, uses these three phases of Edison's early experiments. Let's take a look at modern audio equipment, study the various parts, and determine the function and operation of each (the pickup, the amplifier, and the reproducer).

Pickups

Pickup is the name given to any device that changes mechanical vibrations into electrical vibrations. Some of the more common types of "pickups" are microphones, cartridges in record player arms, and photoelectric cells. Although these devices look different, their basic purpose is the same in all cases.

A. *Microphones.* There are many different types of microphones; however, the velocity, dynamic, and crystal ones are the most commonly used.

The velocity microphone is also known as a ribbon mike because it changes air vibrations into electrical vibrations by means of a suspended ribbon that vibrates between the poles of a permanent magnet. This microphone must be talked into from the front or the back and is classified as bi-directional. It is so directional that any sounds striking the microphone from the side will rarely, if ever, be heard over the loud speaker. The velocity mike is used primarily for individual or small-cast productions.

The dynamic microphone receives air vibrations upon an extremely thin diaphragm which translates them into electrical vibrations in a moving coil. The dynamic microphone is classified as nondirectional because sounds are picked up from any angle with equal intensity. This type is used for productions with a large cast, orchestra, or chorus.

The crystal microphone uses a diaphragm that is connected to a small crystal of special salt. Air vibrations striking the diaphragm bend the crystal which then creates its own minute, corresponding electrical vibrations. The crystal microphone, depending upon its size and shape, may be either one-directional or nondirectional. Although this microphone is not as sensitive, and therefore not as expensive, as the velocity or dynamic microphones, it is quite satisfactory for school use and is usually furnished with most portable recording equipment.

B. *Record Player Cartridges.* The plastic or metal cartridges that hold the needles in the pickup arm of record players are of two general types, the crystal and the magnetic. The function of both types is the same, for each receives the mechanical vibrations of the needle as it travels along the varying grooves on the record, and changes the vibrations into corresponding electrical vibrations.

The crystal pickup is the type supplied with most record players and is quite serviceable for most purposes.

The magnetic pickup is more expensive, superior in performance, and more faithful in its response. However, because of the weakness of the electrical signal it produces, a "preamplifier" is a necessary addition to the equipment.

C. *Photoelectric Cells.* Photoelectric cells function in the same way as microphones and cartridge pickups, except that instead of changing mechanical vibrations of air or a needle, they transform variations of light into electrical vibrations. The photoelectric cell is used in all but the magnetic sound motion picture projectors. Sound projectors are usually equipped with a small lamp (exciter bulb) and a sound-optical system. The light from the exciter bulb passes through a small lens which focuses a very fine beam of light on the narrow sound track of the film. After passing through the film, this light falls on a sensitive photoelectric cell which changes light variations into electrical vibrations.

Amplifiers

An amplifier is constructed of a number of varied parts including tubes, selectors, transformers, and condensers. It is sufficient to say that all amplifiers, regardless of their structure, perform the same basic function—that of amplifying or building up the power of small electrical vibrations produced by any type of pickup. There is a tremendous difference in amplifiers, from the small three-tube variety to the mammoth multi-tube used for extremely high fidelity reproduction. Most audio equipment designed for school, church, and industrial use lies between these two extremes.

The type and kind of amplifier to be procured for school use will depend, to a great extent, upon where, and how, and for what purpose it will be used. There are, however, a few basic requirements that must always be met. These include the following:

A. Input and output sufficient to handle the desired number of pickups and reproducers.

B. A tone control knob for raising or lowering pitch.

C. A low noise level in the amplifier itself.
D. A push-pull output to prevent overloading of the amplifier.
E. Fidelity sufficient to reproduce programs with an illusion of realism.
F. A frequency response range adequate to reproduce clearly and without distortion all tones that are audible to the average human ear (approximately 20 to 20,000 cycles).[1]

Reproducers

Most speakers used in audio equipment are the permanent magnetic, dynamic variety. Speakers operate exactly like microphones, but in reverse. Variations in electrical energy are sent through a magnetic field which displaces a diaphragm in direct proportion to the electrical signals. The diaphragm, in turn, vibrates the air in front of it, sending out the mechanical vibrations known as air waves.

There are loudspeakers available of good quality, low distortion of sound, and even of governable response from bass to treble. Hand-portable equipment is generally equipped with small, lightweight speakers. Although these are adequate for the average classroom, they are not satisfactory for larger rooms. Heavier equipment is generally supplied with a separate speaker box accommodating a larger speaker or a series of smaller ones.

In some instances, such as auditorium use, several additional large speakers are operated from a single amplifier. Care should be taken, however, to read the manufacturer's directions concerning such an arrangement to insure that the speakers are "matched" with the amplifier. The enclosure or baffle in which the speaker is encased is as important as the speaker itself.

In selecting any type of audio equipment, a side-by-side test with other equipment of similar purpose is highly recommended. Conduct such tests in several locations in which the equipment will be used. Listen for clarity and naturalness. The time you spend in evaluating audio equipment will pay big dividends in satisfaction and usefulness.

8. Here is a list of several types of audio equipment. Identify the three basic parts of each type.

Type	Pickup *Changes mechanical vibrations to electrical vibrations*	Amplifier *Amplifies electrical vibrations*	Reproducer *Changes electrical vibrations to mechanical vibrations*
Example: Public Address System	Microphone	Amplifier	Loudspeaker
Record Player			
Radio			
Tape Recorder			
a. Recording			
b. Playing Back			
Sound Motion Picture			
a. Recording			
b. Playing Back			

9. Describe how a knowledge of the principles of sound will assist you in better understanding audio equipment.

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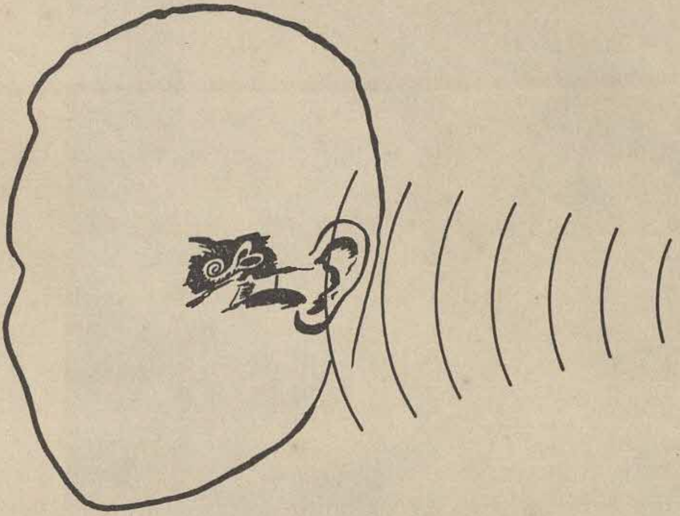
[1] Elmer Burns, et al., *Physics: A Basic Science*, 3rd ed. (New York: D. Van Nostrand Co., Inc., 1954), p. 231.

How We Hear Sound

Sound, its nature, production, and transmission would be of little value if humans were incapable of receiving it. Hearing is the final step in the cycle of audio communication.



The ear is the structure which converts sound waves into sensations of sound.

The audible range extends from approximately 20 to 20,000 vibrations per second. (Each vibration is called a cycle.) The abbreviation for cycles per second is C.P.S. Sounds which are lower than 20 C.P.S. or higher than 20,000 C.P.S. cannot be heard.[2]

With this general background, you should be able to understand the purpose, function, and operation of any audio equipment used to communicate ideas from person to person.

10. If you were going to purchase a piece of audio equipment, why is it important to know the range of its sound reproducing system?

11. List all the audio equipment in common use in schools today.

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[2] *Op. cit.*, p. 231.

12. List all the audio-visual types of equipment in current school usage.

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Oakland Public Schools, California

21

RECORDERS AND RECORDINGS

THE RECORDING and reproduction of voices, music, and other sounds has made an important contribution to educational programs in the United States. Through the recorder, the outstanding musicians of the world can be brought into our classrooms, as can momentous speeches of world leaders bearing statements that have brought both war and peace. We can reproduce the song of the thrush, the roar of the city, or the murmur of the mountain brook. Recording and reproduction equipment forcefully aid hearing to bring another dimension of learning into the educational program.

1. What contribution can records and recordings make to student learning in your subject field or grade level?

San Diego City Schools

LISTENING TO A RECORDED LESSON.

Disc Recorders, Transcriptions, and Playbacks

Although the Egyptians and Chinese claim to have recorded and reproduced sound between 2000 to 3500 years ago, the first practical recording device is credited to the inventive genius of Thomas Edison in 1877. His tinfoil cylinder was the first successful record capable of playing recorded sound. This was quickly followed by the development of the wax cylinder by Alexander Graham Bell, and later by the disc record designed by Emile Berliner. Since that time, a wide variety of materials, including metals, waxes, shellacs, and plastics have been used as the base upon which recordings have been made, and as many playbacks have been designed and used in reproducing the sounds recorded.

Probably the records to date most widely used for educational purposes are discs from 6 to 12 inches in diameter that rotate on the playback at a speed of 78 revolutions per minute (78 rpm). These records play from 3 to 6 minutes on each side.

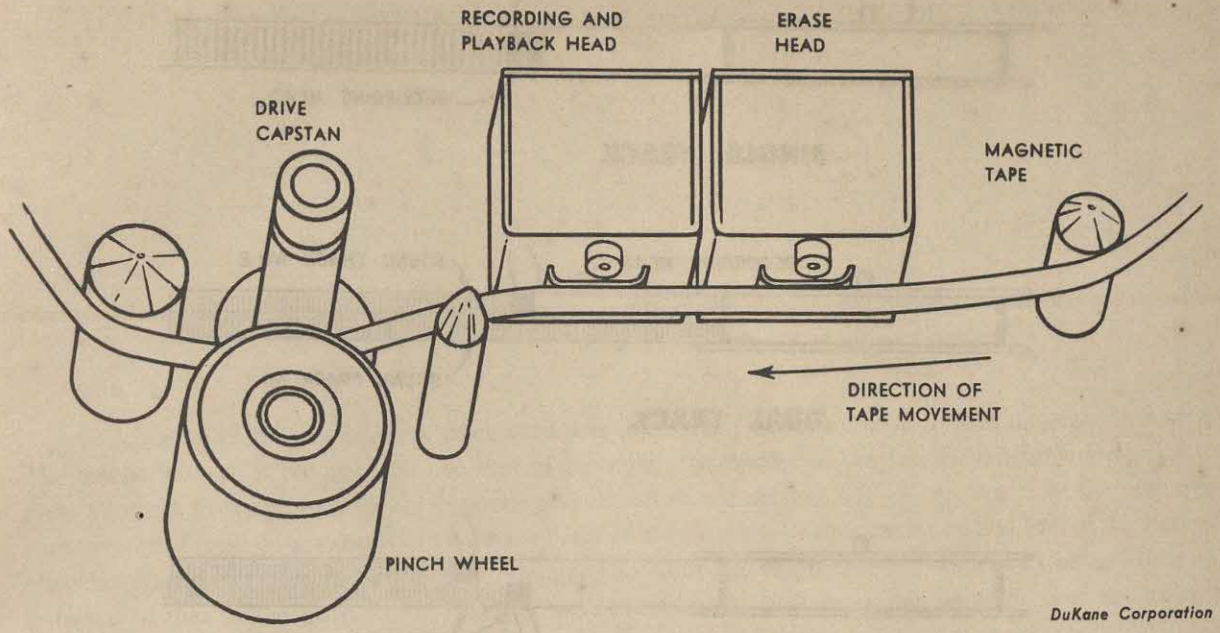
With the improvement in recording and reproducing equipment, a second type of record has been made relatively recently. This is the long playing (LP) or microgroove record. One type of LP record ranges from 10 to 12 inches in diameter, rotates at a speed of 33⅓ rpm, and plays from 10 to 18 minutes per side. A second type of long-playing record (generally known as Extended Play, or EP) is 7 inches in diameter, rotates at a speed of 45 rpm, and plays from 6 to 8 minutes per side.

A third type, used primarily in radio stations, is the transcription. Most transcriptions are 16 inches in diameter, rotate at a speed of 33⅓ rpm, and play for 15 minutes; these are designed to fit the time schedules of radio stations.

A fourth type, called "Talking Books," is recorded at 16⅔ rpm and is used primarily for recording complete books for the blind or the handicapped. Several inexpensive playbacks will reproduce the 16⅔ rpm "Talking Book" records.

Disc Recorders

Most disc recorders are complicated pieces of equipment and should be operated by a person trained for such work. The cutting of the larger discs is an exacting process and should not be tried by inexperi-



DuKane Corporation

RELATIONSHIP OF THE ERASE, RECORDING, AND PLAYBACK HEADS OF A TAPE RECORDER.

enced persons. There are a few simple disc recorders made for use in the schools. These record on the small plastic disc, and can be operated by the teacher with certain basic training.

To make disc records, it is recommended that instructions be followed for the specific recorder being used. Be sure to use the recording blanks that have been recommended for the specific machine. Check the cutting needle and playback needle on your equipment often. Keep your equipment clean and free of record cuttings.

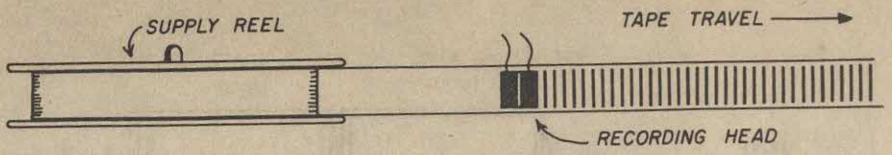
Magnetic Recorders

Magnetic recorders are not new, although they are the latest type of recording to become popular in the schools. There was much experimenting with magnetic recordings before World War II in Denmark, Germany and in the United States. Most of the early magnetic recordings were made with wire, but the difficulty of handling long lengths of wire and other related problems caused the recording industry to turn to strips of paper covered with a coating of iron oxide. Later, acetate and plastic bases were developed. Most of the magnetic recording tape used. today is of these latter types.

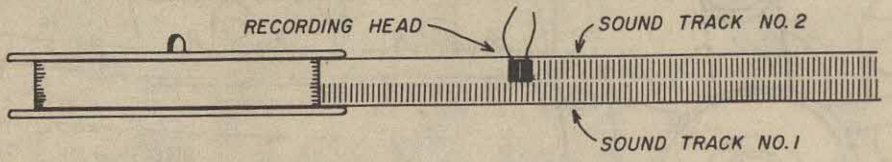
As you will recall from the description in the preceding chapter on the Principles of Sound, the tape recorder consists of three basic parts: A. the pickup or microphone; B. the amplifier; and C. the reproducer or magnetic head. In making a tape recording, the process is relatively simple. Sounds to be recorded activate the microphone which changes mechanical vibrations into electrical vibrations. These latter vibrations are then amplified and, in turn, activate a magnet. As the tape is pulled past the magnet at a constant speed, a varied pattern is established on the iron-oxide-coated tape.

There are several different types of magnetic head arrangements in common use today. These are the single track, the dual track, and the stereophonic track recorders. Multi-track recorders are being used for special purposes, such as video tape recording, but will not be discussed here.

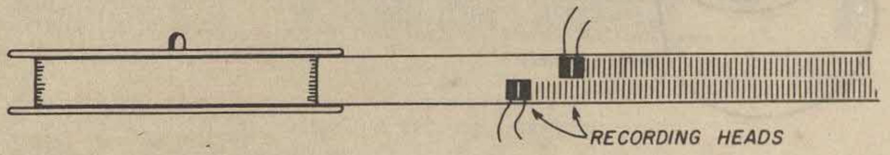
Single track recorders are designed to record on tape which is pulled past the recording head in only one direction. In this instance, the magnet extends over the complete width of the tape resulting in only one magnetic pattern.



SINGLE TRACK



DUAL TRACK



STEREO TRACK

Some *dual* or *twin track* recorders are designed to pull the tape past recording magnets in either direction. The recording head is much smaller in width and records on only one half of the tape. After a recording is made on one half of the tape, the drive mechanism is reversed and the second magnet is activated to record on the other half. In this way, twice as much material can be recorded on the same amount of tape as on the single track machines. Other dual track recorders are designed to pull the tape past the recording magnet in only one direction. After a recording is made on one half of the tape, it must be turned over. This, then, places the un-recorded half of the tape in line with the recording magnet. A second recording can then be made on the un-recorded half.

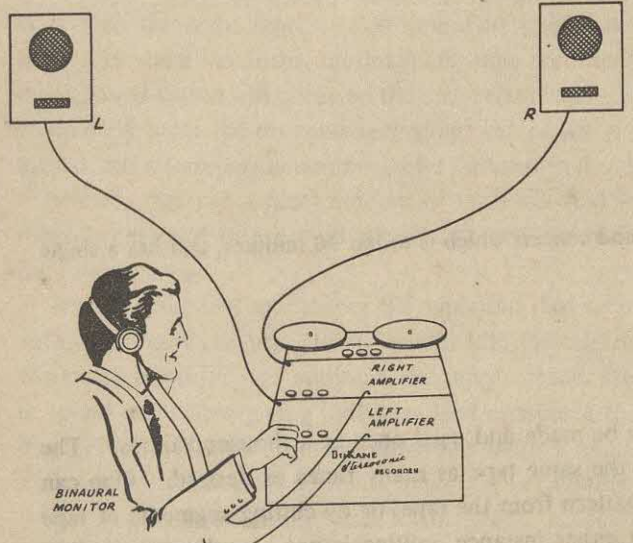
It should be noted that if the tape is to be edited by the cutting out of various sections, the single track recorder presents fewer problems. With a dual track recording, it is impossible to cut sections from one half of the tape leaving the other half intact.

2. What are the special advantages of the dual track magnetic recorder?

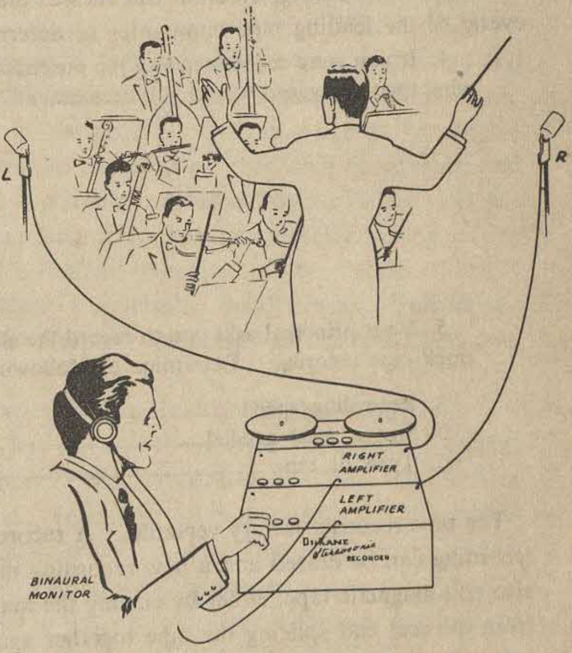
Stereophonic or *binaural* recorders are being used primarily for music and similar purposes where the effect of two dimensional sound is desired. The system used is similar to that for the dual track recorder, since the tape is pulled past two sets of magnets which each record on one half of the tape simultaneously. Stereo recordings are made with two microphones placed at approximately the same distance apart as the human ear. The sound from each microphone is sent to two different amplifiers and then recorded on a separate half of the tape. When the sound is reproduced, two separate amplifiers and speakers are needed. The sound from one half of the track is channelled through one amplifier to one speaker and from the other half of the track through a second amplifier and speaker. This results in the sensation that the listener is present in the room where the music or sound is being recorded. Stereo recording is even more natural if played back through earphones with sound from each track going to a different earphone. Some stereo recorders are equipped with four tracks to produce an even greater stereo effect.

3. In what teaching situations would stereophonic recordings be of greater value than monaural recordings?

An adaptation of the stereophonic track recorders is currently being made in foreign language instruction. The teacher's voice is recorded on one half of the tape. Sentences in the foreign language are spaced to allow students to repeat into the microphone and record on the second half of the tape. In listening again to the recorded tape, comparisons can be made between the instructor's pronunciation and that of the students. Most language-practice tape recorders are designed to allow the erasure of the student's track without disturbance to that of the instructor's. In this way, practice and drill tapes can be used over and over by students without having to re-record the voice of the instructor. Foreign language tape recorders for student practice and drill are available in both portable and deck mountings. Some of the newer language laboratories provide each student with his own tape recorder, while others are designed to operate all recorders from a central location. The type and design of language laboratories depends upon the variety of listening and recording activities that are planned and the purposes for which they are intended to be used.



BINAURAL STEREOPHONIC PLAYBACK



BINAURAL STEREOPHONIC RECORDING

Magnetic tape recorders are designed to operate at various speeds depending on the model and make. The speed is determined by the number of inches of tape which pass the magnetic recording heads in one second. The five common speeds are 1⅞, 3¾, 7½, 15, and 30 inches per second (ips). The slower recording speeds of 1⅞ and 3¾ ips are used for recording the spoken voice, particularly lengthy conferences or meetings. The higher speeds of 7½ and 15 ips are commonly used for recording music and other types of high fidelity programs. Radio stations and sound recording studios usually record at the higher speeds of 15 and 30 ips to enable them to capture and reproduce sounds without distortion. Generally speaking, equipment which records at the faster speeds is more expensive than those which record at slower speeds because of the more complicated amplification system which is needed to obtain the very finest sound reproduction.

The recent development and use of foreign language laboratories has created a conflict of opinions among foreign language and sound specialists concerning tape speeds and the quality of the reproduced sound needed. Although the 3¾ ips recorders are less expensive and will reproduce sounds fairly clearly, frequency response of these machines is limited. This will not enable the student to distinguish between the pronunciation of words which contain sounds such as "fee," "see" and "the." Great care should be taken in the selection of recorders, if they are to be used for foreign language instruction, to be sure that the students can distinguish between various sounds and hear them clearly and distinctly without distortion.

The recording and playback speed of the equipment and the type of magnetic recording head arrangement (single or dual track) will determine the amount of magnetic tape that is necessary for any particular recording job. One half-hour program can be recorded on a 7 inch reel of standard tape with a single track recorder at a speed of 7½ inches per second. At 3¾ ips, this same tape will carry a one-hour program.

Magnetic recording tape is available in many different reel sizes for different uses. It is also available in different thicknesses from ½ mill to 1½ mills. The one mill tape, for instance, provides 50 per cent more recording time per reel than does the standard 1½ mill tape.

New developments in the production of tape are providing the field with a wide variety of tape with different types of backing, different thicknesses and various degrees of fidelity. It is advisable to check with several of the leading tape companies to determine the latest developments in this rapidly changing field.

4. If you were recommending the purchase of a magnetic tape recorder for use in your own subject field, what recorder speed would you recommend? Why?

5. Your principal asks you to record the student band concert which is to last 30 minutes, and has a single track tape recorder. Determine the following:

a. Recording speed __________
b. Size of reel needed __________
c. Type of tape ____________________

The tape recorder is very versatile. A recording can be made and used once or a thousand times. The recording can be erased and a new recording made on the same tape as many times as desired. One can also edit magnetic tape, either by erasing the magnetic pattern from the tape, or by cutting segments of tape from the reel and splicing the tape together again. In either instance, editing is not complicated or difficult.

Which Type of Recorder Should I Use?

Although the disc and magnetic recorder serve the same purpose, that of recording voice, music, or other sound, each has special characteristics which make it valuable for certain types of educational programs. The speech or elementary reading teacher often wishes to make reference recordings of each student at the start of the semester and at intervals during the course. The disc recorder, with its small plastic discs, is the most inexpensive method of making such recordings. The same function could be accomplished by the magnetic tape recorder, but a number of student voices would have to be recorded on the same tape. Referring back to the sounds of a specific student's voice on magnetic tape would take time. With the disc recorder, the small, inexpensive discs could be filed with the student's records and located immediately for student progress collation.

A LEARNING EXPERIENCE IN LANGUAGE WITH THE MAGNETIC RECORDER.

State University of Iowa

If immediate playback is the primary consideration, the magnetic recorder would be more effective and inexpensive. The student could record his reading, play it back for study, and then another student could record on the same tape. Each time a new recording is made, the previous recording is erased from the tape. In some instances, the magnetic tape recorder will not erase the previous recording completely, and background sound will occur on the new recording. There are two common reasons why a recorder does not completely erase the previous recording: the presence of dirt on the erasure head; and overrecording, which may cause a semipermanent magnetic pattern on the tape that is difficult to erase.

Schools that use a great amount of tape will find it advisable to purchase a "bulk" eraser. This equipment is designed to erase all recorded sounds from reels of tape rapidly and easily and assure clean tape for re-recording.

The development and use of the tape and disc recorders have given teachers an invaluable teaching tool with which they can bring living sounds into the classroom. They can also be used for evaluation of student work and for drill. In addition, the tape recorder frees teachers of much repetitive work and allows them to spend more time giving individualized assistance to students. Teachers, in small schools that have combined classes, find that by recording their lectures and assignments for one section of the class, they can work with another section while the first section is listening to the recording with earphones.

The variety and extent of uses for magnetic recording possible in schools is unlimited, for new applications will be found daily by the resourceful teacher.

6. How would you make use of a tape recorder in your subject area or grade level?

Why Are Records Used?

There are probably more record players (playbacks) in the schools than any other type of audio equipment. This seems to indicate that, for a variety of reasons, teachers have found records a valuable adjunct to teaching.

7. List the major values which account for the wide adoption of records and transcriptions in schools.

a.

b.

c.

d.

e.

8. What do you consider some of the major disadvantages in using records and transcriptions?

a.

b.

c.

Using Records and Transcriptions

The use of records and transcriptions requires a skill that must be developed in students. This is the skill of listening. Just listening does not insure learning, for the learner must comprehend the material and develop understanding. Teachers must train their students in the art of "listening" and give them constant guidance. It must be remembered that these materials are not automatic teachers.

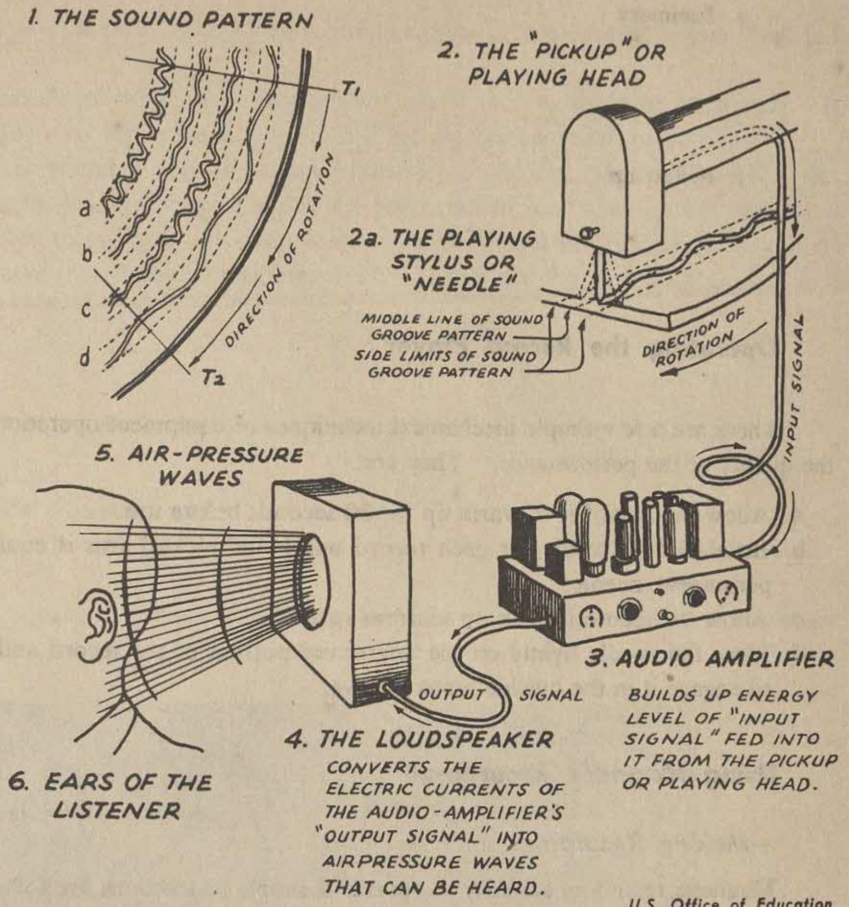
The values that any students gain from listening to records or transcriptions will be directly proportional to the purposes for which they are used and the utilization techniques employed.

Records or transcriptions can be used for many purposes. They can be employed to introduce a unit, develop a unit, summarize a unit, or as collateral material. Again, methods will depend upon instructional purposes.

9. Fill in the following outline, indicating *how* you would use a record or a transcription in your own subject field.

Title of Record:

Purposes for using material:


1. THE SOUND PATTERN
T1
a
b
c
d
T2
DIRECTION OF ROTATION
2. THE "PICKUP" OR PLAYING HEAD
2a. THE PLAYING STYLUS OR "NEEDLE"
MIDDLE LINE OF SOUND GROOVE PATTERN
SIDE LIMITS OF SOUND GROOVE PATTERN
DIRECTION OF ROTATION
INPUT SIGNAL
5. AIR-PRESSURE WAVES
3. AUDIO AMPLIFIER
BUILDS UP ENERGY LEVEL OF "INPUT SIGNAL" FED INTO IT FROM THE PICKUP OR PLAYING HEAD.
OUTPUT SIGNAL
4. THE LOUDSPEAKER
CONVERTS THE ELECTRIC CURRENTS OF THE AUDIO-AMPLIFIER'S "OUTPUT SIGNAL" INTO AIRPRESSURE WAVES THAT CAN BE HEARD.
6. EARS OF THE LISTENER

PLAYING BACK RECORDINGS

U.S. Office of Education

a.

b.

c.

Steps in Utilization:

a. Prepare yourself

b. Prepare the classroom

c. Prepare the class

d. Present the material

e. Summary

f. Follow-up

Operating the Record Player

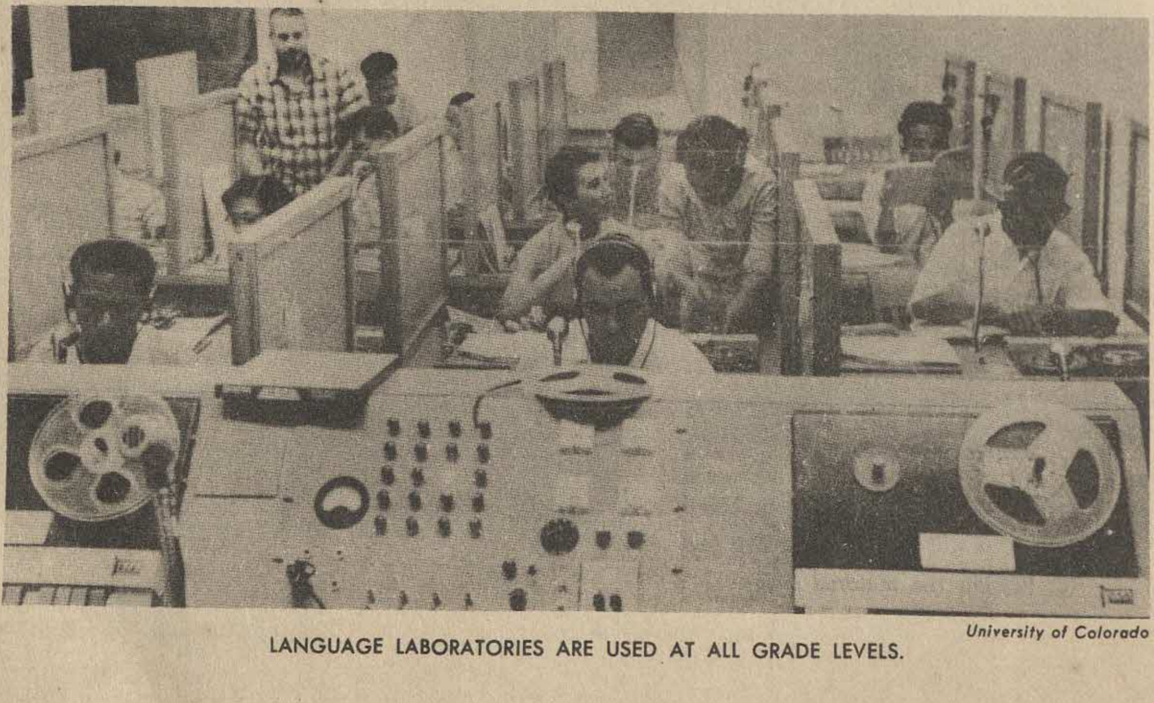
There are a few simple mechanical techniques of equipment operation which, if followed, will improve the quality of the performance. They are:

a. Allow the amplifier to warm up for 30 seconds before use.
b. Install a new needle for each record unless the pickup arm is equipped with a permanent or semi-permanent needle.
c. Allow the record to pick up uniform speed.
d. Place the needle lightly on the ungrooved portion of the record and allow the rotation of the record to engage it in the outside blank groove.

Using Magnetic Recordings

—Making Recordings

Magnetic recorders are easy to operate if simple instructions are followed. First, determine the speed of your recorder. Most modern magnetic recorders will record at two different speeds, such as 3¾ and 7½ inches per second. Set the recorder for the desired speed. Remember, the faster the speed of operation, the better the quality of sound. Second, determine whether the recorder is single, double, or stereo track. Third, check the microphone to determine if it is uni-directional or multi-directional. The type of recording job to be done will determine the type of microphone to use. A uni-directional microphone is not



University of Colorado

LANGUAGE LABORATORIES ARE USED AT ALL GRADE LEVELS.

recommended for recording class discussions. These characteristics must be determined before you start operating the recorder.

The location and type of controls on magnetic tape recorders will vary from one machine to another. It is suggested that the instructions for your tape recorder be studied for correct operation procedure.

Placement of the microphone for sound pickup is an important step in making good recordings. Because of the great variety of microphones, and varying acoustical properties in rooms, no specific directions can be given here to assure balanced recordings. It is advisable to make several test recordings of various microphone placements to determine the particular location which will produce the best results.

Listening to Recordings

The operation of the tape recorder for classroom listening is not difficult. The steps are:

a. Thread the tape into the machine.
b. Turn on the amplifier and allow it to warm up for 30 seconds.
c. Throw the selector switch to the "listen" position.
d. Start the recorder.
e. Check the placement of the speaker to enable all students to hear the recording clearly and without distortion.

University of Colorado

INDIVIDUAL BOOTH IN A LANGUAGE LABORATORY.

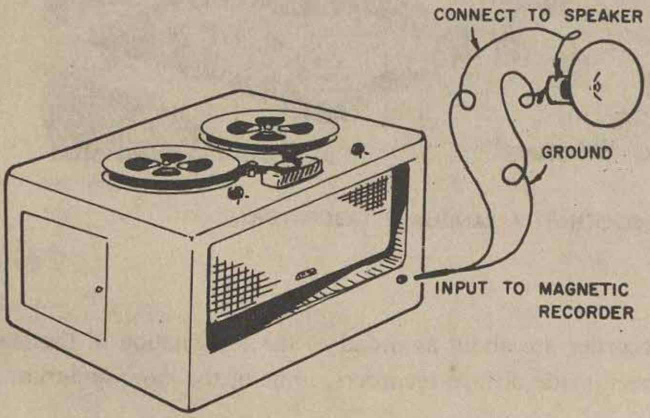
The varied uses of the magnetic tape recorder are about as broad as the imagination of the teacher and pupils. Hundreds of different uses have been made of tape recorders, some of the more important being:

Music	Allows the student to hear his own playing and listen to the recordings of experts; saves the time of the accompanist by recording in advance; lets the individual hear his part in the total group
Speech	Allows the child to hear his own mistakes in speaking; lets the child record

	and evaluate talks before they are presented to the group; improves the quality of the voice expression, tone, and enunciation
Drama	Records parts from plays so the student cast can improve the presentation; provides for listening to the presentation of well-known actors
History and Social Studies	Brings dramatic presentations of historical events into the classroom; records current events for discussion; records political debates and discussions of world leaders
Language	Aids the student in foreign languages, letting the student record his language lesson and evaluate his own experience; brings prepared language lessons to the classroom for the beginner
Business Education	Varied use in typing and shorthand

State University of Iowa

A RE-RECORDING MAGNETIC TAPE LABORATORY.



DIRECT PICKUP FROM RADIO SPEAKER TO MAGNETIC RECORDER

The preceding outline lists only a few of the possible uses of the magnetic recorder if it is available to the resourceful teacher. Wherever hearing of voices, music, or other sounds are important in learning, they can be made available by magnetic tape for immediate use by one student or the entire class.

Sources of Recorded Magnetic Tape

To supplement the tapes made by the school, there are many sources of recorded tape programs. Many commercial companies are preparing and distributing taped programs in a variety of subject areas. Musical programs are available in stereo. In addition, the "Tapes for Teaching" programs are available in many states through the State Department of Public Instruction or the Audio-Visual Bureau of State Universities.

In most instances the "Tapes for Teaching" programs are not available on a loan basis. The school requesting programs sends blank rolls of magnetic tape to the recording laboratory, where the programs that have been requested are re-recorded on the school's own tape. In this way the tapes become the property of the school, which can build its own permanent library. This makes these tapes available for use at any time desired. Some recording laboratories make a small charge for the re-recording service, and in other instances the service is free.

Magnetic tape recordings are available on such subjects as conservation, child development, English, speech, foreign languages, guidance and occupation, health, history, music, science, and the social studies. Many of the original programs were taken from educational radio broadcasts.

Selecting Record and Transcription Playback Equipment

Although records and transcriptions can be played on almost any playback equipment, it is wise to consider the following criteria in selecting new equipment:

A. Portability: Most school equipment must be moved from place to place for maximum use. Equipment that is bulky and heavy has less chance of being used to the fullest extent.

B. Versatility: With the introduction of LP records, new equipment should be able to play at least three speeds (33⅓ rpm, 45 rpm and 78 rpm). It should be able to accommodate record sizes from 10 to 16 inches in diameter and be provided with a pickup arm capable of playing both standard and long-playing records. (Because of the microscopic size of the grooves of LP records, a light 2-ounce arm and a fine needle are required.)

C. Performance: One of the most important criteria in selection is the actual performance of the equipment. It should have high fidelity (true reproduction of tone), uniform speed control, low noise level, and be capable of using a high quality needle.

D. Simplicity: For maximum use the equipment should be easy to operate. Switches and controls should be simple, accessible, and well-labeled. For most school uses, a record changer is not necessary.

E. Rugged construction: The equipment design should provide safety features for the protection of the equipment, records, and personnel. The playback should be built to provide maximum use with minimum servicing. However, allowances should be made for easy replacement of parts.

F. Price: Most audio equipment today is fairly priced. The purchaser gets what he pays for. Higher fidelity and additional features increase the purchase price. Equipment should be selected for the educational job to be done rather than the number of "extras" which may be available.

G. Reputation of the company: It is always advisable to investigate the integrity of the company from which equipment may be purchased. Availability of repair parts, speedy and efficient maintenance service, and fair trade-in allowances for old equipment are essential in keeping equipment in constant use and modernized to meet changing needs.

10. List three sources from which you can get records and tapes in your own subject field:

a.

b.

c.

Selecting a Magnetic Recorder

There are a great many tape recorders on the market. They vary in price from about one hundred dollars to several thousand dollars. The average tape recorder for school use sells from between one hundred and fifty dollars to two hundred and fifty dollars.

In selecting a tape recorder, analyze the various uses you expect to make of it, and then select one that you feel will do the job.

Consideration should be given to the following criteria when selecting a magnetic tape recorder:

A. Portability: Recording equipment should be light weight and easy to carry if it is to be moved from one room to another or from school to school.

B. Versatility: If the equipment is to be used only for school speech work, a less expensive recorder can be used that will operate only at the one speed of 3¾ inches per second. If the equipment is to be used for a variety of purposes and in a variety of classrooms, it should operate at several speeds such as 3¾ and 7½ inches per second. It should also accommodate reels of tape at least 7-inches in diameter.

C. Performance: It should record and reproduce good sound, and operate at constant speeds. It should have a speaker or speakers large enough to give true reproduction of music and speech.

D. Simplicity: It should be easy to operate and be equipped with a minimum of buttons and knobs. It should have a control to prevent the erasure of recorded programs by mistake. Knobs and control buttons should be labeled. Easy access to the recording and erasing head for cleaning is highly desirable.

E. Construction: The construction should be sturdy enough to withstand the necessary punishment it will receive in being moved from room to room. It should have a good, solid carrying handle. The recorder should be contained in one complete case.

F. Price: Do not select magnetic recording equipment by purchase price only. The more expensive recorder may be cheaper in the long run. Select equipment on the merits of performance and how well it meets the needs of the educational program in the school.

G. Company and dealer: It is always wise to choose a recorder which is well-known and has a good reputation in the educational field. It is also wise to purchase equipment, if possible, from a dealer in your own state and city who can service the equipment. All equipment needs servicing from time to time. If the recorder can be serviced in the local community, you will avoid the long delays of sending it back to the factory.

11. Inspect several different magnetic tape recorders, using the above considerations for selection. Indicate the name, model, and manufacturer of a tape recorder that would be most satisfactory for your use. Indicate the reasons why it would be best.

Name: Model: Manufacturer:

Why I selected the above recorder:

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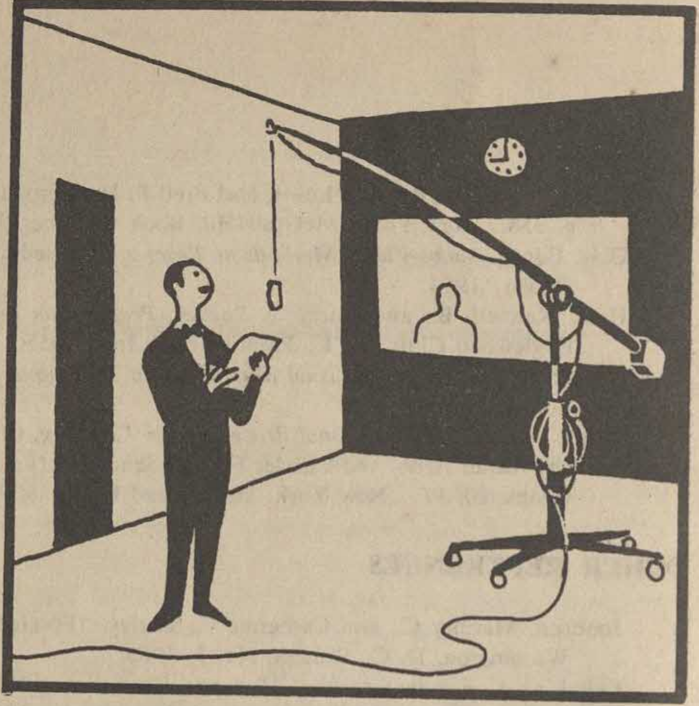

RADIO

22

BY DEFINITION, radio is the transmission and reception of signals by means of electric waves without the use of connecting wires. It is one of our most potent methods of mass communication.

In the short period of sixty-five years, radio has grown from a gadget in Marconi's workshop to a permanent fixture in American homes. Many of us can recall our first experience with radio, as we sat, bent over, pressing earphones tightly to our ears, and wondering what the future held for the black box filled with wire and tubes.

Radio is an integral part of the lives of the American people. According to the 1959 Yearbook Issue of Broadcasting, 97 per cent of all homes in the United States have radios. In addition, each home listens to one hour and 45 minutes of radio each day. This does not include the amount of radio listening people do outside of their homes, such as driving to and from work, or school.[1]

1. Describe briefly how radio has influenced or changed the daily life of the American family.

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[1] 1959 Broadcasting Yearbook Issue, Washington, D. C., Broadcasting Publications, Inc., p. A-21.

WHILE SOME STUDENTS PARTICIPATE IN THE BROADCAST, OTHERS OBSERVE.

Atlanta Public Schools

Broadcasting

The participation of students in the broadcasting of radio programs is rapidly increasing. Many values can be derived from such activity. For example: Broadcasting,

A. is highly interesting and a strong motivation stimulus.
B. provides an outlet for student ability and talent.
C. develops better speech habits.
D. provides an opportunity for student creativity.
E. stimulates a spirit of cooperation and responsibility.
F. develops a keener sense of radio appreciation, which is the basis for effective program selection.

2. List additional advantages which may result from student broadcasting.

Listening

Radio listening, whether conducted in or out of school, contributes immeasurably to the student's fund of information. It exerts an influence on his attitudes and appreciations, social behavior, and power to develop critical thinking.

San Diego City Schools

STUDENTS LISTENING TO A BROADCAST FOR PART OF THE DAILY ASSIGNMENT.

In addition, radio provides for self-motivation, creative expression, and even the development of skills and techniques.

These values, however, are often overlooked or discounted because many problems arise when teachers try to use radio as an integral part of the students' learning experience.

3. Can you list six major deterrents to the use of radio listening in the school?

a.

b.

c.

d.

e.

f.

It is unwise to assume that because students "listen" to a radio program, they have automatically learned. Radio listening is a skill and it must be taught as a skill to students. Some of the important factors in listening are:

A. Development of concentration.
B. Increase of attention span.
C. Selection of important statements.
D. Development of recall through testing.
E. Discrimination of valuable, worthwhile programs.

Whatever the local problems may be in the use of broadcasting or radio listening, the school has a responsibility to help students develop good program selection, listening habits, and to stimulate the production of worthwhile programs.

Types of Radio Explained

Continuous development and experimentation has brought the people of the world a wide variety of radio techniques, including AM and FM broadcasting, and facsimile recording. We are concerned here, however, only with radio broadcasting and listening. The two major types of radio in common use in the schools are AM (amplitude modulation) and FM (frequency modulation), each of which has its own advantages and limitations.

AM, the method used by most commercial stations, is the process of sending radio signals with the frequency vibrations kept constant but the amplitude or power of the fixed wave frequency allowed to fluctuate.

FM, which is used by most educational or local stations, is the process of sending radio signals at very high frequencies. The amplitude or power of the radio wave is kept constant but the frequency wave is allowed to fluctuate.

4. List the major advantages of AM for school purposes.

Advantages

5. List the major advantages of FM for school purposes.

Advantages

Selection of Equipment

Four basic factors should be considered before radio equipment is to be selected for the classroom. These are:

A. the educational objectives of classroom audio activities;
B. the specific broadcast programs that are, or will be, available for classroom use;
C. the methods of transmission used by the broadcasting stations offering the desired material; and
D. the type of classroom radio receivers needed to tune in these programs.[1]

In addition to these basic factors, teachers and administrators must consider the ease of operation, the performance, the safety design, and the durability of any radio receiver before purchasing it for the classroom.

It is becoming quite common to make tape recordings of radio programs. It is, therefore advisable to select a radio which is equipped with an "output jack." This will enable the person making the recording to plug the recorder directly into the radio amplifier which will result in a higher quality recording.

6. If you wanted to record a radio program, but your radio did not have an "output jack," describe how you would make such a recording without the use of a microphone.

Utilization and Evaluation of Radio

In considering the utilization and evaluation of radio, we must discuss both broadcasting and listening, for each has its own techniques.

Student Broadcasting

Contrary to popular belief, providing students with broadcasting experience does not require a great deal of expensive equipment. A simulated experience can be created by the use of props made from wood, scrap metal, and wire. A tape recorder can be used to capture the program for study and discussion. The use of the school's central sound system also makes for reality. Obviously, the more equipment and facilities a school has for broadcasting, the more real the experience becomes; however, equipment should not be a major barrier to providing school broadcast experiences for students.

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[1] Classroom Radio Receivers. (Washington, D. C.: U. S. Office of Education and the Radio Manufacturers Association, Washington Radio Manufacturers Association, p. 5, 1948.)

There are many types of school broadcasts that can be produced, including interviews, talks and reports, panel or round-table discussions, quiz shows, newscasts, announcements, musical programs, dramas, variety shows, and more. The teacher's imagination is the only limitation on types of programs that can be produced by students.

7. Describe how you could use three different types of student broadcasts in your own subject matter area or grade level.

a.

b.

c.

Student broadcasts, like all other instructional techniques, must be based upon sound educational principles. Purposes and objectives must be identified.

A script, which is the heart of any broadcast, should be thoroughly studied and checked. The teacher must determine the significance of its running time, content, interest or dramatic qualities, smoothness of transition, and reading ease. If the script is to be produced, are adequate personnel and facilities available to provide talent, music, and sound effects? When these factors have been determined positively, the next steps are to select the cast, rehearse, and present the broadcast.

After the broadcast, the class should evaluate the experience to determine the effectiveness of this type of activity in relation to the objectives and purposes that were determined at the outset.

8. Draw up an evaluation sheet which you would use in appraising student broadcasts. Include those items which you feel are most important.

Program Listening

Before a schedule of programs that might be used in the classroom can be drawn up, we must determine what programs are available. There are several sources for this information. A few sources are:

A. National Network Educational Departments (NBC, CBS, ABC, MBS)
B. Federal Radio Education Committee
C. Statewide Radio Stations
D. Local Radio Stations
E. State Universities (Radio or Extension Departments)
F. State Departments of Education

When the availability of national, regional, and local programs has been established, it is then necessary to select the programs that will best correlate with your teaching procedures and content. This can be done prior to the opening of the school term, for most educational programs are scheduled months in advance. Many such programs also have study materials, program notes, and announcements available for early distribution.

9. On the form below, list several programs that you would select and could use in your own subject matter area or grade level.

Program Title	*Purpose*	*Time*		*Station*	*Availability of Educational Material*
		From	*To*		

Although there is no single way to use radio listening in class, there are logical steps that teachers might follow: These are:

A. Prepare yourself
    (1) Examine the scripts or program information in advance.
    (2) List questions for class discussion before listening to the broadcast.
    (3) Assemble any supplementary material that may be necessary.
B. Prepare the classroom
    (1) Place the radio in the front of the room.
    (2) See that the school clock or your watch is synchronized with the station clock to insure accurate timing.
    (3) Tune the radio before class, to avoid delay later.

C. Prepare the class
  (1) Discuss the topic to be heard.
  (2) Relate the program to the subject being studied.
  (3) Question the students about information to be gained.
  (4) Make assignments if necessary.
  (5) Summarize the discussion on the chalkboard.

D. Listen to the program
  (1) Eliminate all distractions.
  (2) Adjust volume and tone.
  (3) Check the outline as the program progresses but don't distract students by writing on the chalkboard during the broadcast.

E. Summarize and follow-up the program
  (1) Summarize the program in terms of the points originally discussed.
  (2) Clarify concepts and point out significant problems.
  (3) Answer questions and clear up any misconceptions that may have been tormed.
  (4) Identify areas that need further study and make assignments where necessary.
  (5) Summarize the entire experience.

After you have used a particular radio broadcast in your classroom, it is important that you evaluate the educational significance of the experience. It is only by making such an evaluation that you can really determine its effectiveness in the teaching and learning situation.

10. In the space below, draw up an evaluation form which you would use to check the appropriateness of a radio listening experience in your own classroom.

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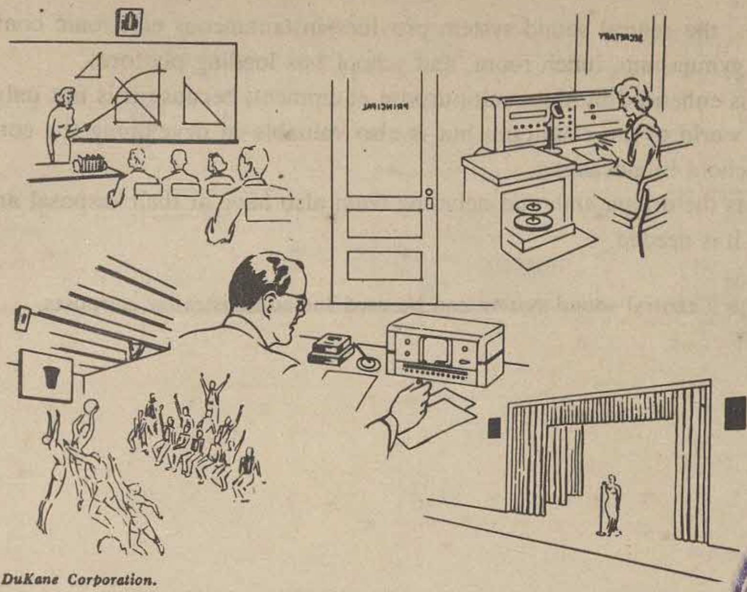


DuKane Corporation.

STATE INSTITUTE OF EDUCATION
Govt. of West Bengal

23

CENTRAL SOUND SYSTEMS

THE CENTRAL or school sound system is a composite of many different types of audio equipment integrated into an organized system. It includes facilities for radio reception, recording, record and tape playing, and all types of local production. It allows for channeling any program material to any individual classroom, a series of classrooms, or to all classrooms simultaneously. The heart of any central sound system is the control panel usually located in or near the principal's office. This control panel, with its keys, switches, microphone, amplifiers, and other audio equipment, is the distribution point for all program material.

Most complete central sound systems include provisions for communication with classrooms, an automatic bell signal for beginning and ending class periods, and provisions for the amplification of programs originating in the auditorium, gymnasium, athletic field, or the orchestra room.

Although many systems differ in flexibility, method of operation, and type of audio equipment, the potential educational value of the central sound system should not be underestimated.

Why Is it Useful?

Central sound systems were introduced into schools as a practical answer to the increasing demand for the use of audio equipment in education. It was felt that a central, flexible audio system could more economically meet the administrative and instructional needs of the school than could the purchase of a variety of single purpose devices.

For administrative purposes, the central sound system provides instantaneous electronic contact with all classrooms, the athletic field, gymnasium, lunch room, and school bus loading platform.

The instructional program is enhanced by this multipurpose equipment, because it is not only capable of bringing the air waves of the world to the classroom but is also valuable in developing the communicative skills of students through in-school broadcasting.

Extra-class programs such as the drama club and debating team also have at their disposal an instrument for sound amplification where it is needed.

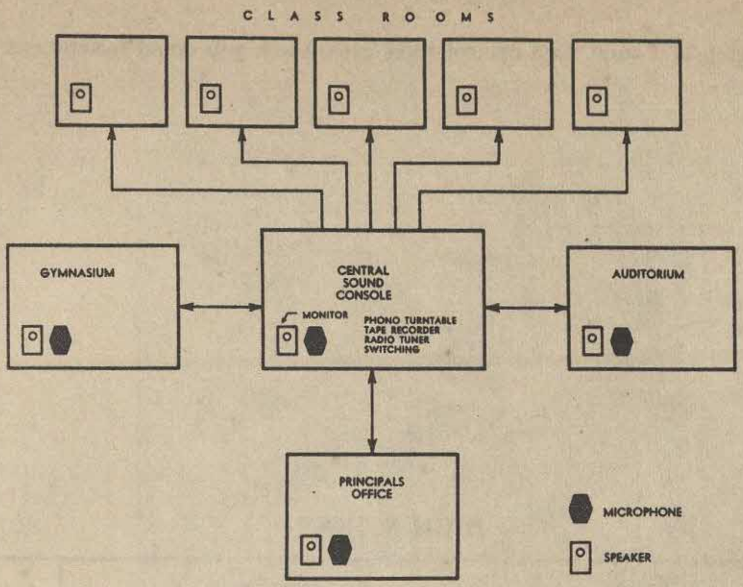
1. List some of the ways a central sound system can be used for administrative purposes.

2. List some of the ways a central sound system can be used for instructional purposes.

3. Suggest several ways a central sound system can be used for extra-class activities.

Selection and Location of Equipment

A great deal of planning should be done before any central sound system is purchased for a school. First, realizable goals or objectives should be established on both an immediate and a long-range basis. Secondly, a program and a plan for audio education should be formulated. Finally, equipment designed to accomplish the predetermined objectives should be purchased and installed.



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THE CENTRAL SOUND SYSTEM SHOULD SERVE THE ENTIRE SCHOOL.

The type of central sound system that might be installed in any school should be selected in terms of the use to which it will be put, the funds available, the size of the school, and similar factors. All systems, however, will have three basic parts: (1) the pickup, (2) the amplifier, and (3) the reproducer. (See Chapter 20.) Additional features can be included with almost any central sound system.

4. If you were requested to submit recommendations concerning the installation of a central sound system in a high school, what specific features would you include? (Describe.)

Location of the control panel often determines the extent and type of use made of the central sound system. Too often, this panel is placed in the principal's office or in a small room adjacent to it. This location, although advantageous to the administrative use of the equipment, often detracts from or completely eliminates its instructional use.

For best results, the control panel should be placed in a large acoustically treated room, or in a control room, separated from a studio by double plate glass. Such a room or rooms should be air-conditioned if possible, centrally located, and protected from hall noise by "sound locked" doors.

With flexible equipment properly located, the central sound system can serve the needs of the school.

5. Draw a sketch of a studio and control room area which you could recommend for a specific school.

HIGH SCHOOL [1]

From		*To*	*Audio Activity*	*Sent To*
	A.M.			
8:25		8:30	Recorded soft organ music played.	All rooms
8:30		8:35	Announcements: Student M.C. and student announcers—day's special events, results of contests, principal's announcements.	All rooms
8:35		8:45	Short address: visiting alumnus, from principal's office.	All rooms
8:45		9:00	Transcription: episode in life of Lincoln.	Am. Hist. class
9:05		9:30	Transcription: radio class practice recorded previous day.	Radio class
9:05		9:20	Radio program, Ohio State University.	Biology class
9:30		10:00	Recording: Student voices, speech studio.	
9:30		10:00	Portable phono-turntable used in French class.	
10:00		10:30	"Broadcast" of English usage script.	Eng. 9–11 classes
10:30		10:45	Radio newscast "broadcast" and recorded simultaneously.	World Prob., Sec. 1
11:15		11:30	Radio newscast (transcription of previous broadcast)	World Prob., Sec. 2
12:15		12:45	Phono-music records played for noonday dance.	Gymnasium
	P.M.			
1:15		1:45	Recording: chorus in music dept., broadcast practice.	
1:15		1:30	Radio newscast (transcription of previous broadcast).	World Prob., Sec. 3
1:30		1:45	Round table discussion in speech class.	English 12 class
1:45		2:00	Transcription: The Constitutional Convention.	Soc. Sci. class
1:45		2:00	Portable phono-turntable used in Spanish class.	
2:00		2:30	Radio class practice in radio workshop, separate amplifier.	Workshop
2:15		3:00	Speech class voices recorded: Speaking choir.	
2:30		3:00	Verdi's Requiem Mass "broadcast" for choir listening.	A Capella Choir
3:00		3:45	Recording and broadcasting simultaneously: joint special drama-music program from orchestra room, radio workshop and announcing studio, mixed at central control panel.	All rooms
6:00		6:15	Recording: newscast for use in social science tomorrow or later.	

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[1] U. S. Office of Education and Radio-Television Manufacturing Association, *Teaching With Radio, Audio, Recording and Television Equipment,* (Washington, D. C.: U. S. Office of Education, 1953, pp. 28–29.)

THE CENTRAL SOUND SYSTEM CAN PLAY AN IMPORTANT PART IN CLASSROOM INSTRUCTION.

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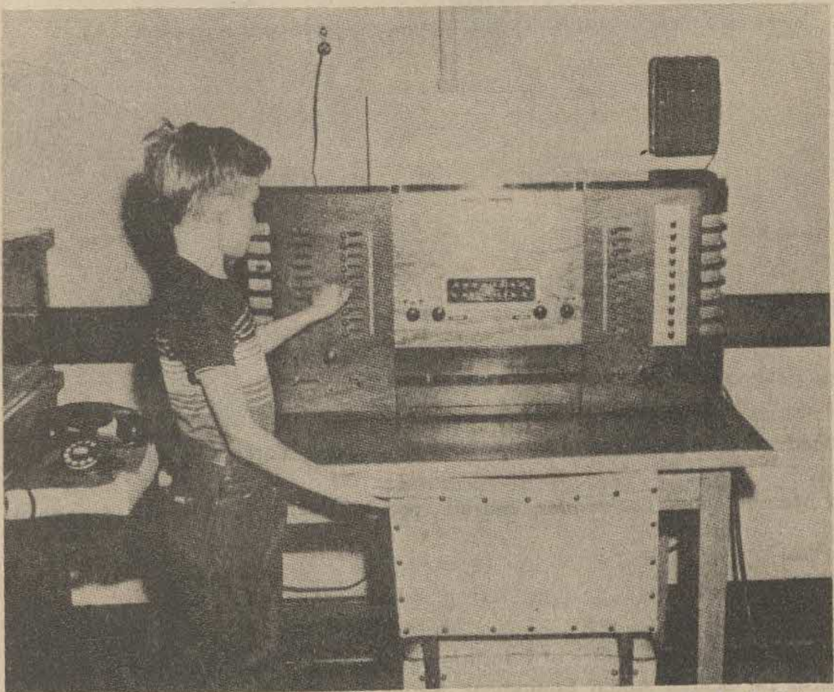

STUDENTS OFTEN ASSIST IN OPERATING THE CENTRAL SOUND SYSTEM.

St. Louis Public Schools

Using the Central Sound System

The effective utilization of the central sound system depends on three basic elements: (1) a place, (2) a person, and (3) a plan. The first element has already been discussed. The second, a person, is of extreme importance, for someone must take the responsibility for training student operators, coordinating programs, and editing in-school program materials. Finally, a well-rounded program designed to utilize the equipment's unique features will justify its procurement.

The following typical daily program suggests the effective use of a central sound system.

6. List several ways you could use the facilities of a central sound system in your teaching.

7. Describe several ways your students could actively participate in the operation of a central sound system.

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TELEVISION

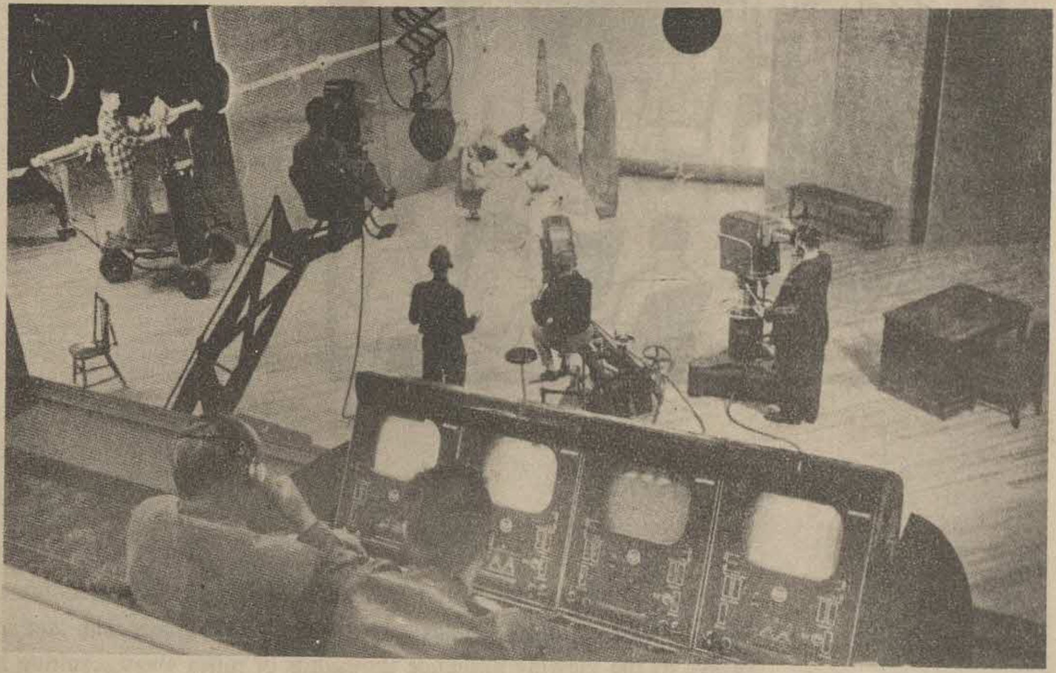
24

WITHOUT DOUBT, television is the most exciting means of communication ever devised by man. It has an immediacy that spans time and space and brings to the viewing audience thousands of miles away, exciting historical events in the making. With the development and acceptance of color in television, we can expect even greater reality in this medium for the future.

The part that educational television will play in education is still to be determined. Hundreds of experiments have been conducted in both broadcast and closed-circuit television at all levels of education. Answers to certain problems of the effectiveness of television in education are known, and research specialists are still searching for other answers. School administrators are looking toward educational television with the hope it may help relieve the increasing crowded conditions in our schools. In general, educators are aware of the potential of television as a powerful new audio-visual device, and no doubt research will provide guidelines for its use.

The date of April 14, 1952 will long be remembered in educational television circles as the day the Federal Communications Commission made an allocation of 242 (later 257) television channel assignments for educational use. The commission also gave educational institutions only fourteen months to file for the educational channels, indicating that at the end of this time the channels would be available for commercial purposes. When, on June 2, 1953, only a relatively small number of educational television stations had filed for permits with the Federal Communications Commission, an extension of time was granted. This extension allowed more time for constructive planning of educational television in different states and regions.

The first educational television station to go on the air was at Houston, Texas, in April of 1953. Iowa State University, Ames, Iowa, was operating a television station several years prior to 1953, but it operated on a commercial television license as do several other educational institutions. In the years from 1953 to 1960, less than fifty of the 256 educational television channels allocated were on the air. Educators were finding that television demanded not only a large initial investment but also a continuing operating expense each year. To be practical, most educational television is now offered in dense population centers where large audiences can be reached for either in-school programs or adult education groups.



State University of Iowa

PRODUCING AN EDUCATIONAL TELEVISION PROGRAM.

TYPES OF EDUCATIONAL TELEVISION

Open-Circuit Television

Open-circuit broadcast television means that the signal is sent out from a transmitter. This type has an advantage of covering an area from 45 to 70 miles, depending on the surrounding terrain. If the terrain is level, the signal will travel a considerable distance but if it is rough, such as in a mountain area, the signal may travel only short distances. Broadcast television will only travel in a line from the transmitter tower to the antenna where it is being received.

Closed-Circuit Television

Closed-circuit television means that the signal is carried over coaxial cable, and is limited to a small geographical area. This type of television is limited by the length of the coaxial cable. It does have a distinct advantage for closed-circuit television has no licensing problems with the Federal Communications

Commission; it can be operated whenever desired by the school, and channeled to any location. In addition, several channels can be used, enabling a school system to televise a number of programs simultaneously. For example, the Washington County, Maryland, Closed-Circuit Educational Television Project has six channels in operation and can televise six programs at the same time. While open-circuit television in most regions has only one channel available, closed-circuit can add as many channels as desired by adding an additional coaxial cable for each circuit. In an area of dense population, closed-circuit television may be more successful, because of its flexibility, than will open-circuit television. Another example of the flexible nature of closed-circuit television is at San Jose State College, California, where coaxial cable to four local public schools has been installed. This enables the televising of programs in any of the four schools and transmission of them directly to the college classrooms for observation and teacher training purposes.

There are two types of open-circuit television, namely: Very-High-Frequency, better known as VHF; and Ultra-High-Frequency, known as UHF. The more commonly used is VHF television that has a limit of only 12 available channels, while 70 channels are available in the UHF. Since television broadcasting started in the VHF channels, most television receivers were built to receive only this type of program. Later, all-channel receivers were built but due to higher cost and other complications they were never very successful and only a few were sold. (Of the 257 television channels reserved for educational purposes, only 86 channels are VHF while 171 are UHF.) This creates problems, for if educational television is to be used for adult education programs and home study, only a small number of home receivers can receive UHF programs.

1. Investigate the television programs in your own state or area and list all programs you think would have educational value for in-school viewing.

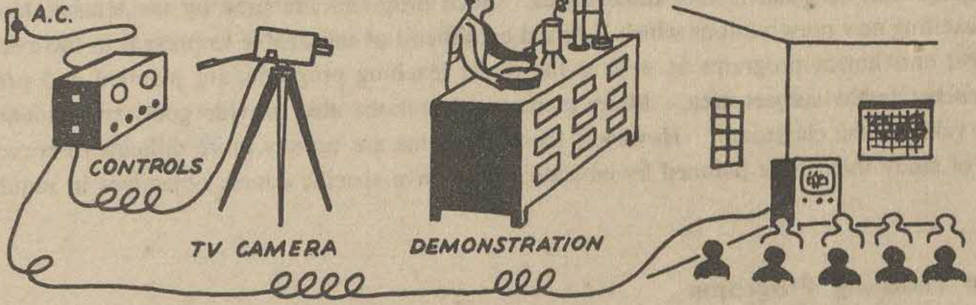
a.

b.

c.

d.

e.



LINE TO CLASSROOM OR AUDITORIUM TV RECEIVER OR RECEIVERS.

2. Outline briefly how you think closed-circuit television would be of assistance in teaching in your subject field.

Types of Educational Programs

Three types of educational programs are in common use on television. These are the demonstration, supplementary or enrichment, and direct teaching types.

Demonstration Type Program

This kind of program is often seen on commercial as well as educational channels. It televises a classroom in action, or perhaps some outstanding activity in the school's educational program. It is often presented as a public relations device to show the community what is taking place in the local schools.

Supplementary or Enrichment Programs

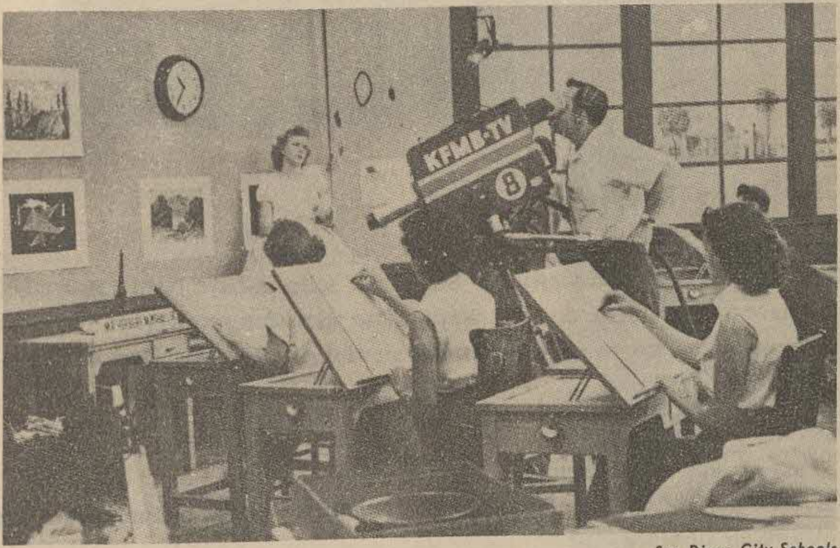
The supplementary or enrichment program is being used in many schools in such subjects as art, music, social studies, science, guidance, and history. Course enrichment programs provide materials related to individual courses in the basic school subject area. Such programs are used by the teacher to bring into the school exciting new presentations which it would be difficult or impossible to present in the average classroom. Most enrichment programs as well as the direct teaching programs are planned and presented by a master teacher in the subject area. Many commercial stations also provide good enrichment materials that are of value in the classroom. However, these programs are usually more difficult to coordinate into the course of study than those planned by educators who have specific course objectives in mind.

Direct Teaching Programs

Direct teaching programs are being telecast at all levels of education from the elementary school through the high school, and they cover a large selection of courses both in college and adult education.

ELEMENTARY CHILDREN ENJOY HELPING PLAN AND PRESENT TELEVISION PROGRAMS.

Michigan State University



San Diego City Schools

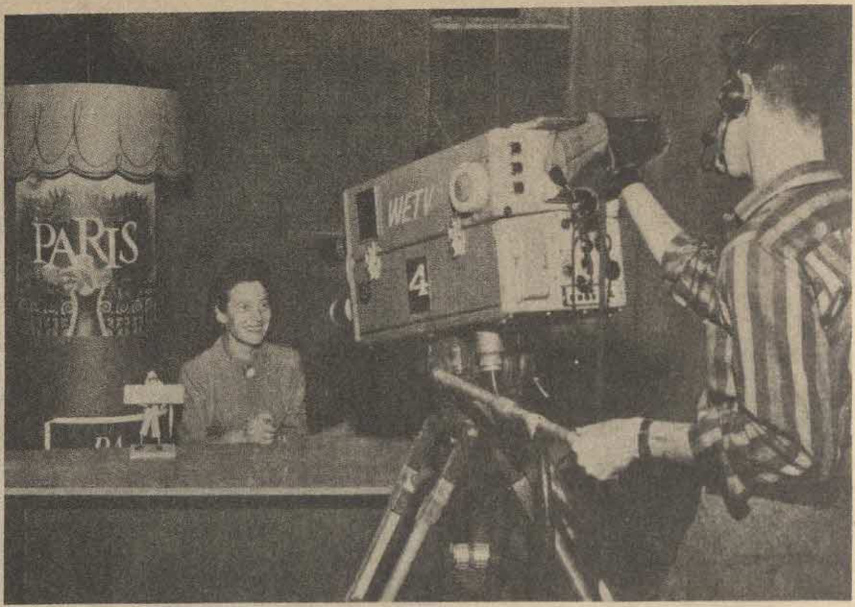
THE TV CAMERA ENLARGES SO ALL STUDENTS CAN SEE.

Numerous research projects have been conducted to measure the relative values of television teaching compared with conventional classroom methods. In practically every instance the results have shown that the grades of television students are comparable, if not better than those of classroom students. Other research projects will provide additional insight into this problem in the near future.

3. List four reasons why you think that students taking television courses receive comparable grades to regular classroom students.

a.

b.



TEACHING FRENCH BY TELEVISION.

Atlanta Board of Education

c.

d.

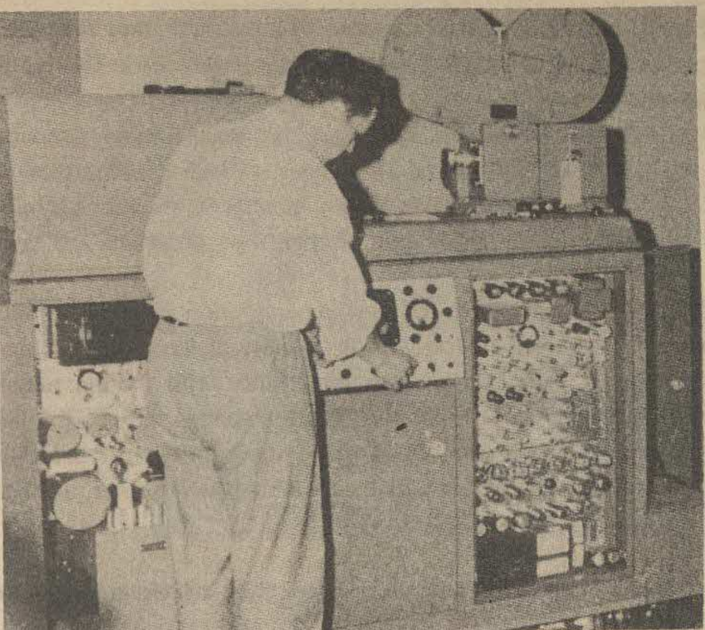
Physical Arrangements for Using Television

Most classrooms have not been built for television viewing. Some new schools have been constructed with television reception, but we will have to continue to contrive ways to use television receivers in the older classroom. The following arrangement of the television receiver for viewing in the classroom is recommended:

Height from floor —4½ ft. to 6 ft.
Picture tube size —21 or 24 inch is satisfactory
Viewing distance —5 times picture width for closest student and 15 times picture width for maximum distance
Placements —place receiver so direct light will not fall on tube
Number of students per set—21″ set—between 18 and 22 students
24″ set—between 20 and 25 students
Two or more sets —if two or more sets, arrange them so each group of students sees only one receiver
Light control —Because of transmitted light the classroom need not be as dark as for projected pictures, but light control is necessary in most instances. For best viewing, some daylight or artificial light should be present.

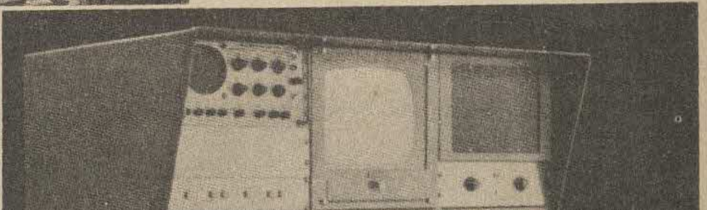
Kinescope and Video Tape Recorders

Many educational programs, both now and in the future, will not be produced "live." They will be recorded on a kinescope or a video tape recorder. A kinescope recording is a motion picture film of a live telecast program, photographed from the monitor tube. Some colleges and universities, although they



ADJUSTING A KINESCOPE RECORDER.

State University of Iowa



A VIDEOTAPE RECORDER.

Ampex Corporation

may not have a television station, have some studio facilities to make kinescope recordings (television cameras and monitoring equipment with a kinescope recorder). In this way they can produce many kinescope recordings for use on a number of educational television stations in the area or state, or even distant stations. The video tape recorder is the latest development and is being used widely in commercial television to record programs for immediate playback. The video tape equipment has a distinct advantage over the kinescope recorder since the film recording of the kinescope must be photographically developed prior to use, however the video tape can be played back immediately much the same as a magnetic tape recording. At present, video tape equipment is quite expensive, but it is thought that future developments in this equipment will make it quite practical for educational purposes.

The National Educational Television and Radio Center, New York, New York, has made a major contribution to the field by assisting in financing the production of educational kinescopes, and distributing them to educational television stations all over the United States. This program greatly benefits new stations by providing them with kinescopes for broadcast while staffs for the production of their own programs are being procured.

Kinescopes made from live television programs are also valuable for showing as motion pictures in classrooms, provided that permission can be obtained for such use However, the quality of the projected kinescope in a motion picture projector in many instances is not as good as films made with motion picture cameras. But the possible use of kinescope recordings as motion pictures greatly expands the possible use of these materials in remote areas where educational television is not available. Many kinescopes made for television purposes are now available for non-television uses, through the Audio-Visual Center, Indiana University, Bloomington, Indiana.

4. What do you believe are the advantages of kinescope recordings over "live" television programs?

Using Television in the Classroom

Television, like other instructional tools, must be carefully used to yield the best results in the classroom. If possible, obtain advance information about the program, so you can prepare the students before the viewing. Most educational television stations provide a study guide to use with an educational program or series of programs. The following study guide was taken from the Iowa TV Schooltime, series of television programs, presented by WOI-TV in association with the Iowa Joint Committee on Educational Television: [1]

LET'S EXPLORE SCIENCE
Lesson 14—Thursday, January 22
Let's Weigh Things
Teacher—George Worley—Iowa State Teachers College
Recommended for Grades 5–7

Before the program:

A. List as many units of weight as can be recalled by students.
B. Make a display of all available devices for measuring weight of solids, liquids, gases.
C. Make a collection and display of known weights from a grain to 10 pounds. Use dry sand in cellophane bags to make the larger weights. Learn to judge weights by "heft."

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[1] *Iowa TV Schooltime*, Iowa Joint Committee on Educational Television, (Des Moines: State Department of Public Instruction, State Office Building, 1959, p. 30).

Atlanta Board of Education

EVERY STUDENT MUST BE IN A GOOD VIEWING POSITION.

During the program:

The history of weights will be discussed and illustrated. Old and new methods of determining weight with simple equipment will be shown.

After the program:

A. Discuss the problems arising from weightlessness in space travel.
B. Make an accurate balance, a barometer, an experimental pendulum, a Circassian diver, a toy car with adjustable center of gravity.

If educational television programs are to be of value in the classroom, they must be made important to the student. A follow-up discussion and perhaps a quiz over the important points in the program might be desirable. The program may suggest possible projects or readings the students can do. Use the program as a springboard into the use of other audio-visual materials.

The immediacy of television makes it an outstanding teaching tool. It takes the student to the place of origin of the program. A television program from the United Nations in New York will often be of more value and be more direct in approach than if the students were actually visiting the United Nations Building, since the television cameras have a "front row seat."

It hardly need be said that if television programs do not contribute to the course of study, they should not be viewed by the class. Plan your use of television program-viewing to gain the greatest possible educational experience for the students.

5. Outline the recent developments in educational television. If desired, this can be done on the national, state, or local level. (Indicate which level.)

Seattle Public Schools

TELEVISION WILL HAVE AN IMPACT ON THE CLASSROOM OF THE FUTURE.

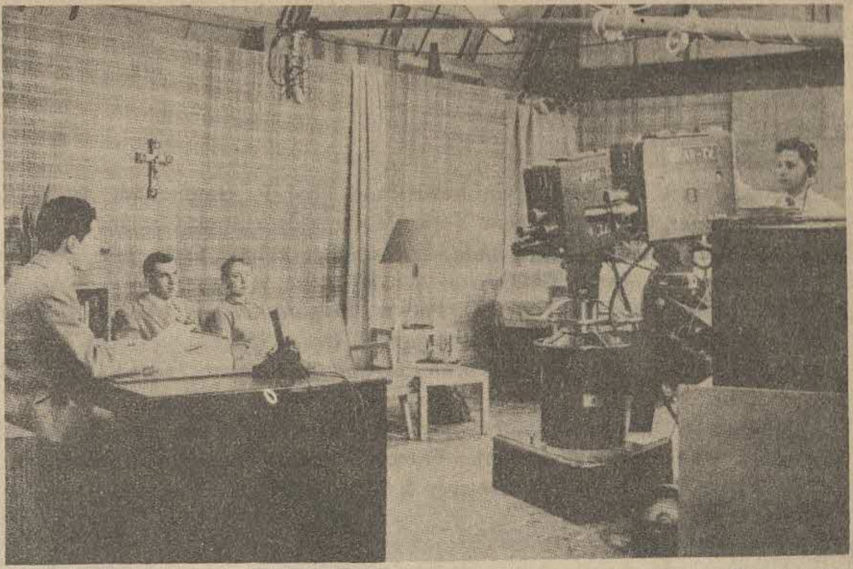
Television Receivers for the Classroom

If television is to be used in the school, adequate receivers must be made available. They should be mounted on a mobile platform with handles on each side, so they can be moved from room to room and up stairways, if necessary. Individual receivers should have a locking device for all controls to prevent unauthorized use of the equipment. If the equipment is to be used in a number of classrooms in the same building the advisability of installing a built-in amplifier, "master" antenna system should be investigated. Such a system, if properly installed, prevents interference between sets in adjacent classrooms, and provides uniform picture quality all over the building.

6. Outline a proposed program to improve the television viewing habits of a group of students. (Indicate whether it is an elementary, junior high, or high school group.)

The Future of Educational Television

There is little question regarding the influence television has on the average citizen in this country today. It is estimated that 80 per cent of the American homes have television. With an estimated viewing audience of from 50 to 75 million people watching key programs, there exists a powerful influence on our



TELEVISING AN EDUCATIONAL PROGRAM FROM WKAR-TV, MICHIGAN STATE UNIVERSITY.

Michigan State University

way of life. Educators not only face a challenge in trying to teach children how to select the better commercial television programs that may have cultural values, but further have the problem of devising educational programs to improve instruction in this period of critical educational crisis. Television is here to stay, and teachers as well as school administrators must find ways to harness its power for the betterment of education.

We are on the threshold of a new way of teaching and learning that can affect our entire way of life and contribute immeasurably to the cultural growth of our country. Hundreds of research projects are in progress with both closed-circuit and open-circuit television. Other research projects are needed to find ways of using this new device to enrich the educational program, and to improve instructional techniques. The "Continental Classroom" program offered over the NBC-TV network during the 1958–59 school year enrolled over 4,500 students for credit in an atomic physics course. One "master" teacher taught this course with credit offered through 350 different colleges and universities all over the United States. Television is a mass teaching device. Therefore, we must think in terms of bold, imaginative experimentation if we are to determine how it can best be used to improve and broaden the learning experiences of students.

7. Outline an evaluation blank for television programs.

STATE INSTITUTE OF EDUCATION * Govt. of West Bengal

TEXTS

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Haas, Kenneth B., and Harry Q. Packer, *Preparation and Use of Audio-Visual Aids,* 3rd ed., Chap. 14. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1955.

Kinder, James S., *Audio-Visual Materials and Techniques,* 2nd ed., Chap. 12. New York: American Book Co., 1959.

Sands, Lester B., *Audio-Visual Procedures in Teaching,* Chap. 25. New York: The Ronald Press Co., 1956.

Wittich, Walter Arno, and Charles Francis Schuller, *Audio-Visual Materials, Their Nature and Use,* 2nd ed., Chap. 14. New York: Harper & Bros., 1957.

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Hall, Roger S., *Taking Hold of Television.* New York: National Publicity Council, 1954.

JCET Educational Television Factsheet. Washington, D. C.: Joint Council on Educational Television (published monthly).

Kumata, Hideya, *An Inventory of Instructional Television Research,* rev. ed. Ann Arbor, Michigan: Educational Television and Radio Center.

Radio and Television Bibliography, Bulletin 1956, No. 2. Washington, D. C.: U. S. Department of Health, Education, and Welfare, Office of Education, 1956.

Teaching by Television. New York: Ford Foundation, Office of Reports, 1959.

"Television in Education," Bulletin No. 21. Washington, D. C.: U. S. Department of Health, Education, and Welfare, Office of Education, 1957.

Television in Instruction, An Appraisal. Washington, D. C.: Department of Audio-Visual Instruction, National Education Association, 1958.

AUDIO-VISUAL MATERIALS

Films:

"Television, How It Works!" 11 min., sd., b&w or color, Coronet Films, 1952.
"The Television System," 14 min., sd., b&w, McGraw-Hill, 1954.

Filmstrips:

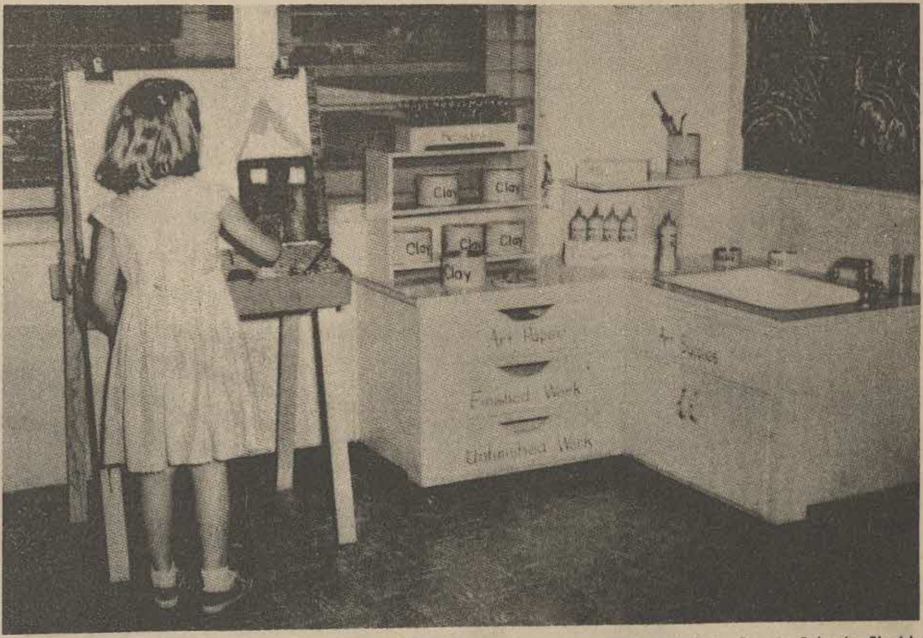
"Teaching by Television," 51 frames, si., color, Basic Skill Films, 1957.

Records and Recordings:

"Teaching by Television," 33⅓ rpm (LP) Educational Recording Services.
"Research in Educational Television," 33⅓ rpm (LP), Educational Recording Services.

UNIT FIVE

THE SCHOOL AUDIO-VISUAL PROGRAM IN ACTION



Dade County Schools, Florida

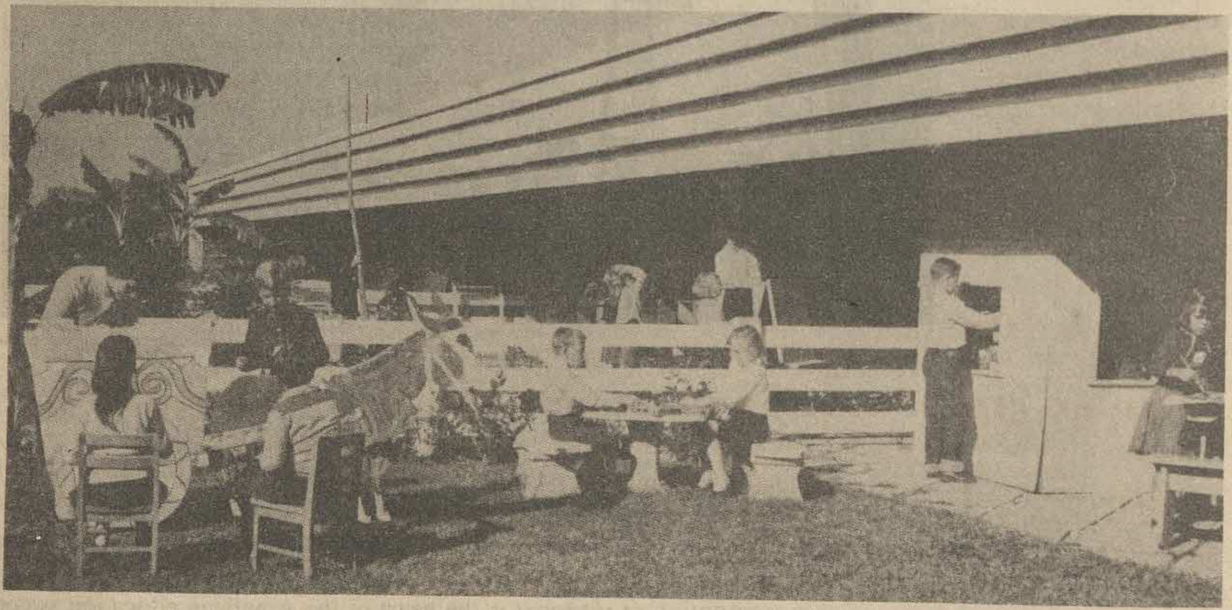
25

THE LEARNING ENVIRONMENT

THE INDIVIDUAL CLASSROOM is the heart of the American education system in the mid-twentieth century. It is the place where children work, study, explore, view, listen, and read for a large part of their active day. The physical environment of a classroom will largely determine the psychological atmosphere in which students must work. It can even become a strait jacket for the curriculum. For example, a bare room would preclude the use of a variety of audio and visual materials and make textbook teaching the prime medium for teaching and learning. The learning environment is one of the fundamental considerations in providing dynamic education.

1. Look around the classroom in which you are taking this course
   a. How does the physical environment of the classroom influence your attitude towards the course?

   b. How does the physical environment affect the type of teaching activities that are conducted?



Dade County Schools, Florida

ACTIVITIES BEYOND THE CLASSROOM.

What Can a Teacher Do About Classrooms?

Brown and others state that:

"A teacher has at least four responsibilities with regard to the physical setting of the classroom: (1) to have some knowledge of physical facilities which should be available; (2) to help plan new district buildings, if called upon, or to be sure some classroom teachers help plan all new buildings; (3) to cooperate with other professional personnel (including building and district audio-visual and instructional-materials specialists) in effecting temporary or basic changes needed to improve unsatisfactory rooms assigned for use, whether old or new; and (4) to know and use devices which will improve the setting of an unsatisfactory room.[1]

2. What can a teacher do to insure that she has an adequate schoolroom?
   a. In an older building:
   b. In a building about to be constructed:

Standards for Classroom Facilities

There are many things which must be considered in designing classrooms that will improve the learning environment. These are:

A. Space;
B. Furniture;
C. Light and Light Control;
D. Ventilation and Heating;
E. Acoustics;
F. Electrical Outlets and Switches;
G. Projection Facilities;
H. Display and Writing Space; and
I. Color and Decoration.

I often hear teachers say, "But what can I do to improve the physical environment of my classroom? The building was constructed 20 years ago and doesn't meet a number of these standards."

This may be true to some extent, but in many cases teachers, principals and parents have cooperatively re-designed and decorated older buildings to make them cheerful, attractive, workable, and flexible school settings for active learning and at very little cost. With a knowledge of what is needed, the ability to work cooperatively, and the desire to provide the best learning environment, teachers can do much to improve classroom facilities.

Space

Classrooms of the past, with long rows of bolted down benches, were designed for rote memory, drill, and recitation. Classrooms of today must be flexible to allow for a variety of class activities and utilization

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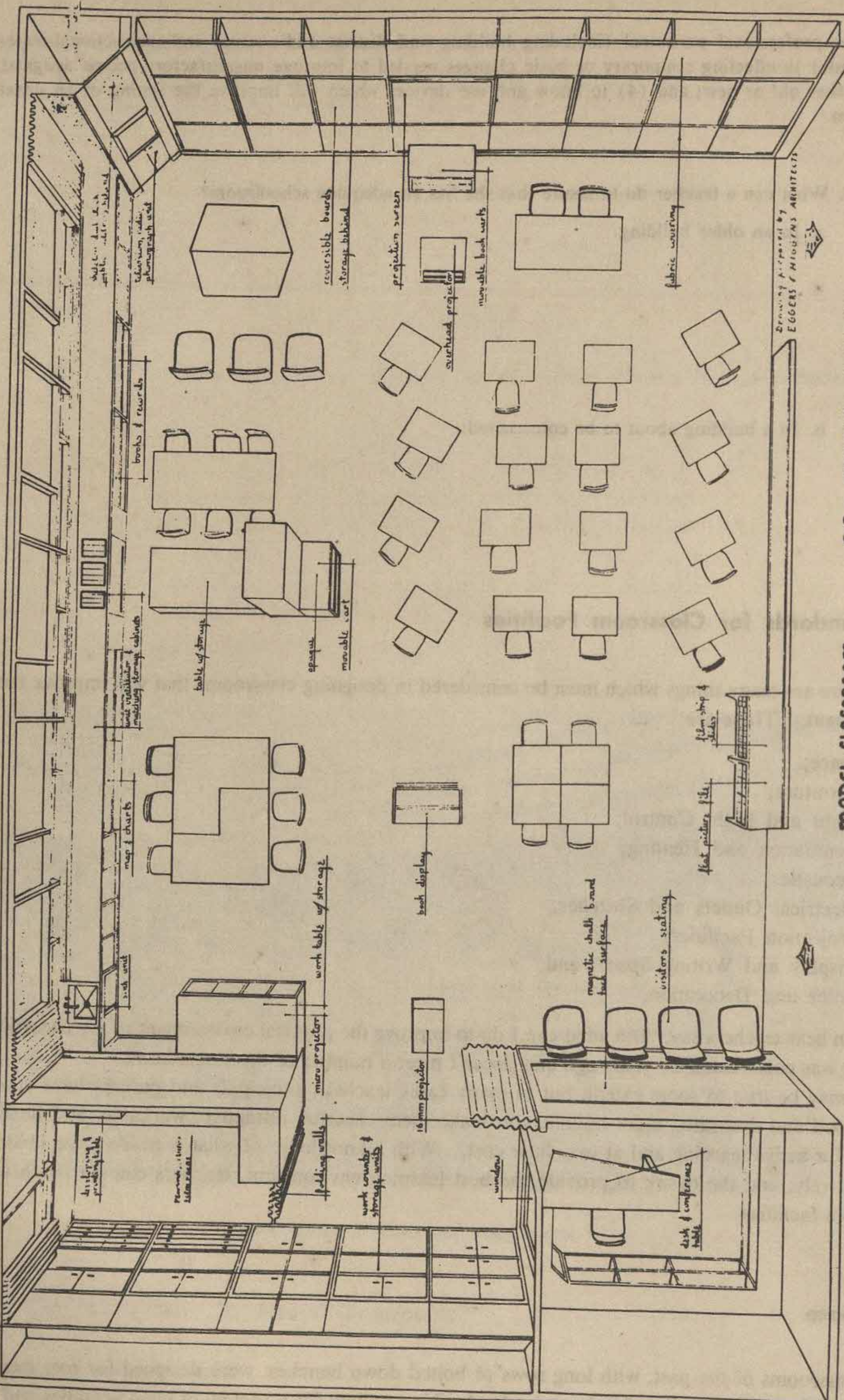
[1] Brown, James W., Richard B. Lewis, and Fred F. Harcleroad, *A-V Instruction Materials and Methods* (New York: McGraw-Hill Book Co., Inc., 1959, p. 470).



Department of Audio-Visual Instruction, National Education Association

CLASSROOM FOR MODERN EDUCATION

of modern electronic devices. The newer architectural designs provide space for real learning and effective teaching. They provide for self-contained classrooms of approximately 1,200 feet, with sinks, hot and cold running water, storage space for file cabinets, chart files, surface work space, storage walls, project areas, projection areas, display areas, teacher preparation areas, and a host of other important ingredients. Elementary school classrooms, particularly, are being designed to meet the needs of modern education, for here the teacher must be a counsellor, record-keeper, consultant, as well as a teacher. Auxiliary space is usually provided for these activities.

The type of space needed and its arrangement will be determined, to a great extent, by the types of learning activities to be used, the age level of students, and the subject matter area.

Furniture

There is a wide variety of school furniture on the market today. Furniture, like arrangement of space, should be selected in terms of the type of learning and teaching activities which are to be conducted. In addition, school room furniture should be functional, comfortable, adjusted to students' height and weight, and movable. Working surfaces should be non-glare finished and damage-proof. Some of the newer materials make writing and working surfaces almost indestructible.

In some classrooms, sectional tables with chairs are advisable, rather than desks, for they provide large working surfaces and additional flexibility for group projects. It is amazing how functional furniture improves working conditions and classroom atmosphere.

Lighting and Light Control

Lighting and light control are vital in the classroom, for most school work demands a great deal of close and continuous use of the eyes. Consideration must be given to both the quantity and the quality of light.

The quantity of light should be sufficient to enable students to do close work, such as reading or writing, without eyestrain.

The quality of light which is conducive to concentration and good study habits must be shadow-free and glare-free. Some of the modern schools are equipped with switching arrangements for overhead lights which allows the teacher to turn on overhead lights in series. This provides for greater flexibility in selecting the amount of light desired under various classroom conditions.

3. Describe the amount of light needed for various types of activities in your own subject matter or grade level.

Activity	*Amount of Light*

San Diego City Schools

DRAPES CONTROL OUTSIDE LIGHT FOR PROJECTION IN THIS CLASSROOM.

Shades, drapes, venetian blinds, and louvers can be used in controlling outside, or "natural" light in the classroom.

In older school buildings having windows with wooden frames, the regular pull-down window shades are commonly used. These window shades need not be dark green or black. They can be almost any color to blend with the décor of the classroom, so long as they are opaque. Flaps or channels are often mounted to the window casing to prevent light leaks at the edges.

In schools which have large expanses of glass, draperies will be found most satisfactory. The newer types of plastic drapes are colorful, fire-resistant, and easy to operate. A track can be mounted on the ceiling on which the drapes can be opened and closed. By mounting drapes about 18 inches away from the wall, and allowing space between the bottom of the drapes and the wall, the room can be ventilated when darkened for projection purposes.

If venetian blinds are to be used to control outside light, the new "full closure" type is recommended. The ordinary venetian blind is not satisfactory for controlling light for projection purposes. The full closure blinds contain up to one-third more slats to the foot than the regular type and are grooved to enable one slat to overlap another. In addition, a light trap is provided on all sides to prevent light leaks.

A more recent development is the outside or inside louvers. Wide strips of thin metal mounted in series, either vertically or horizontally, are being installed in many schools. These louvers can be adjusted from the inside and provide the classroom with just the amount of natural light desired by the teacher.

4. What types of light control facilities would you recommend for the classroom in which you are now meeting?

For the past decade many systems have been developed to meet the need of projection facilities.

In some school buildings lunchrooms, auditoriums, and gymnasiums have been equipped as projection rooms. In others special "Audio-Visual Rooms" have been provided to solve this problem. While these types of facilities may meet the immediate needs of the school, they are not advised for several reasons.

First, projected materials are complementary tools of instruction and should be an integral part of the lesson, just as chalkboards, bulletin boards, and similar materials are used. Students should not be moved from their normal room environment to see a few slides, a film strip, or a picture enlarged by the opaque projector. To the students this interruption represents a "show" which appears to be unrelated to classroom learning.

Secondly, the scheduling of one room becomes a difficult teaching and administrative problem. Only one class or group of classes can be scheduled in the area at one time, thereby limiting the amount of use. Many teachers refuse to use a variety of projected material under this plan because of wasted time and inconvenience. In addition, in multipurpose areas such as cafeterias, auditoriums, and gymnasiums, only a few hours of the school day can be scheduled for the use of projected materials because of the other demands on the space.

Thirdly, the cost of providing an "Audio-Visual Room" is too high. It is estimated that one audio-visual room represents an investment of $15,000.00. For the same amount of money, all of the classrooms in the building could be equipped with light control facilities.

5. What additional problems are involved in moving a class to the "A-V" room?

In the better schools today, every classroom is equipped for projection where the light can be controlled to a level of one-tenth foot candles.

The administrators of these schools realize that projection involves light and shadow and that no satisfactory way, as yet, has been devised to operate projection in the classroom without adequate light control.

Ventilation and Heating

Poor ventilation and improper temperatures create unhealthy and uncomfortable classrooms. This problem is further increased during periods of projection.

Architects today are solving this problem by designing school buildings which have individual thermostats in each room and mechanical ventilation systems which provide six to ten air changes per hour without draft or noise. These systems provide for two-way control by supplying either heat or refrigeration as desired.

The primary purpose of any mechanical system is to furnish clean, pure air which has been heated or cooled for all types of classroom activities.

Acoustics

Learning is not always a quiet process. Unlike former years when complete silence was a virtue, the modern classroom has a noise factor which is mandatory to learning. Tape recorders, record players, motion pictures, and television are tools which generate sound. Adequate acoustical treatment should be provided to avoid distortion of sound. In addition, it should be adequate to prevent disturbance in other rooms.

The noise level should be controlled to prevent interference with speech or music. In addition, open walls, movable partitions and open windows all create problems in controlling sound. The use of acoustical material helps to limit overlapping of sound waves and reduces the noise factor.

There are many types of acoustical materials on the market which can be applied to walls and ceilings. In older buildings, classrooms can be made more functional by the addition of acoustical treatment. It is advisable in all cases of remodeling or new construction to consult with an acoustical engineer to insure the best type and the sufficient amount of acoustical treatment needed.

Electrical Outlets

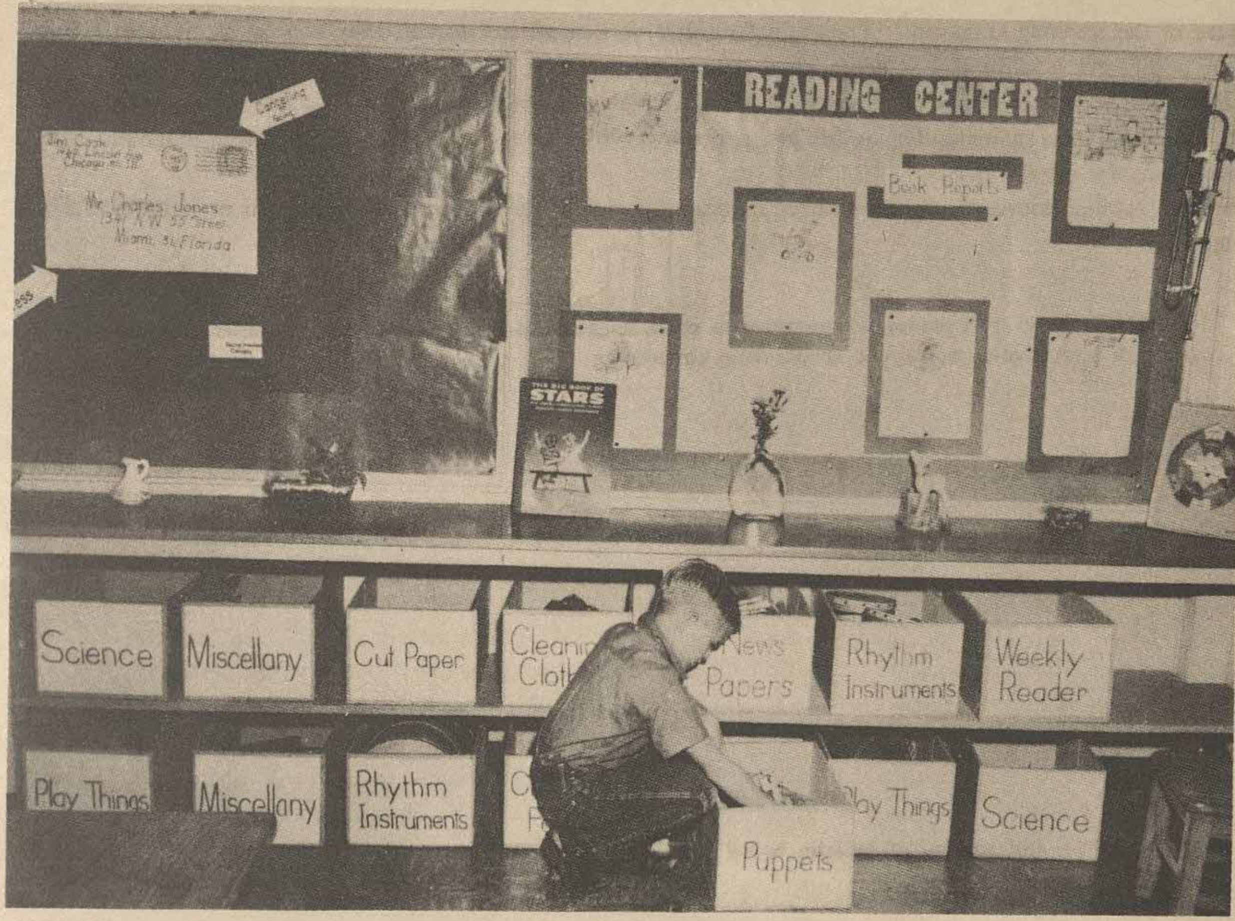
While it is difficult to generalize on the electrical wiring needs of each classroom, several factors should be considered. Electrical outlets should be available at eight-foot intervals, wired for 110 to 130 volts, A.C., and fused for 20 *amperes*. They should be on a separate circuit from the overhead lights and from adjacent classrooms. This will enable the use of electrical power, when the lights are off, and provide for simultaneous use of equipment in several classrooms.

Outlet boxes are best located approximately 36 inches from the floor for maximum convenience. Outlets are also most easily kept free of dirt, wax, and cleaning compounds when located at this height.

Ease of accessibility should determine placement of electrical switches for overhead lights. Thus location of a switch near the projector would facilitate control.

Television Conduit

With the advent of television, newer buildings carry conduits in the floors or walls which connect rooms to one another. The conduits are then fed to a central wall panel box for ease in wire installation. Through such pipes can be pulled coaxial cable and/or antenna wire for either production or reception of television programs in all classrooms. During construction, empty conduit and central control boxes can be installed at relatively little cost compared to that of adding them later.



Dade County Schools, Florida

A WELL ORGANIZED CLASSROOM HAS A PLACE FOR ALL TYPES OF LEARNING MATERIALS.

Projection Facilities

In today's schools, the self-contained classrooms must be provided with projection facilities. Wall-type screens and movable projection stands are a must. As was mentioned in Chapter 14, square, wall-type, 70″ x 70″ screens are desirable. Mounted over the chalkboard, or behind a movable bulletin board, they are out of the way, easily accessible, and protected from damage and dirt.

Movable projection stands also provide for the flexible use of classroom space. They should be sturdy, equipped with at least 4 inch rubber, locking wheels and be able to hold 80 to 100 pounds. Some models are equipped with built-in extension cords or hooks for additional wire

Permanently installed speakers are not recommended at this time. Often, the amplifiers of various types of equipment are not matched for use with speakers other than that provided with the equipment. In addition, speakers lose efficiency with age which necessitates removal or replacement.

Display and Writing Space

The modern classroom is a learning environment in which students spend a large proportion of their working hours. Therefore, it must provide adequate space for a variety of activities. Obviously the type and amount of display and writing space needed will depend upon the type of teaching conducted and the nature of the learning situation. They can be either vertical or horizontal; they should be light in color, at the pupil's eye level, and well lighted.

There are many new types of materials available which provide for a variety of uses. Reversible chalk and bulletin boards, swinging display boards, pegboards with clamps and hooks, combination magnetic- and chalkboards are all of value.

Storage cabinet doors can also be utilized as display space, if they are built of pegboard or bulletin board materials.

6. If you were on a planning committee to make suggestions for a new school (indicate whether junior or senior high), what would you recommend concerning:

a. Type and amount of chalkboard space.

b. Type and amount of bulletin board space.

c. Type and amount of pegboard space.

Color and Decoration

The classrooms of today are no longer bare and cold-looking institutions painted brown or green with dark woodwork. They are decorated with pleasant, cool, pastel coloring, and are often ornamented with draperies and plants. Furniture is light, movable, and functional. The entire atmosphere is one in which students can learn in comfort and convenience.

7. In the space provided, design a classroom which you believe would be most usable for your own teaching.

For more than a decade, the United States has been engaged in a constant battle to provide its expanding youth population with an adequate education. The pressure of the times makes it mandatory to provide not only minimum education, but to train and educate a population which is able to cope with the multitudinous social, political, and scientific problems which face this nation. A key factor in education is the learning environment in which effective instruction is to be given. Architects, builders, administrators, teachers, and the lay public are beginning to recognize the importance of adequate space, functional furniture, light and light control, ventilation and heating, acoustics, electrical outlets and switches, projection facilities, display and writing surfaces, and color and decoration as basic ingredients in providing good education. For, as Winston Churchill once said, "We shape our buildings, and then our buildings shape us."

Over the past two decades we have seen the use of electronic teaching and learning devices skyrocket in popularity. Audio-visual materials in tomorrow's schools will play an even more significant role for educators, and engineers have already completely "electronic" classrooms on the drawingboards.

School buildings which are currently under construction and which were planned without consideration of proper facilities will be obsolete before they are completed. It is the responsibility of teachers, administrators, architects, and parents to work cooperatively in providing the youth of tomorrow with an adequate learning environment where they can prepare themselves for the challenges of tomorrow's world.

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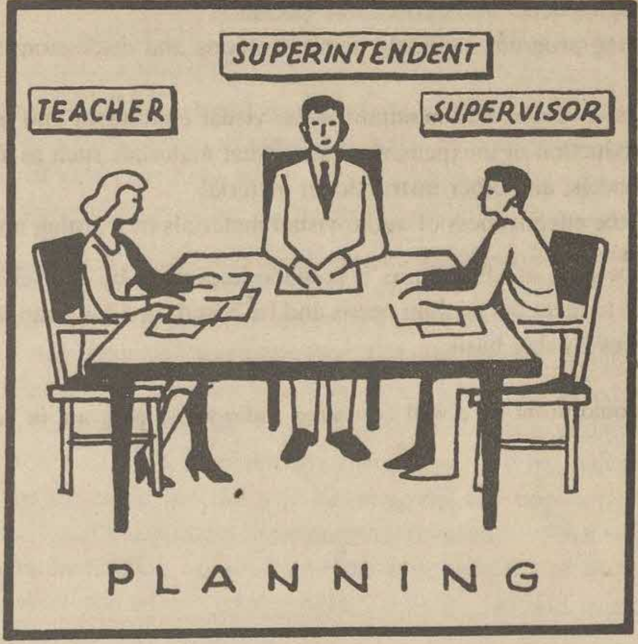

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THE SCHOOL SYSTEMS' AUDIO-VISUAL PROGRAM

INDIVIDUAL TEACHERS or groups of teachers can make effective use of audio-visual materials within their classrooms. However, with the growth and expansion of school systems and school districts, it becomes more efficient and economical to develop a school-wide audio-visual program.

To be successful, the audio-visual program should be well-planned and properly directed and financed. It cannot be dependent upon the charity of the P.T.A. or other organizations for its existence nor on the whims of the administration.

The audio-visual program has as its basic concern the improvement of instruction by providing teachers with the needed materials and equipment at the time and place desired.

To be of prime importance to the entire school system, a program should provide the following:

A. An administrative audio-visual policy indicating the philosophy and objectives to be obtained

B. A well-trained person responsible for directing the program. This person should be primarily an educator with experience in both elementary and secondary curriculum and training in the audio-visual field

C. A center where materials, equipment, and previewing facilities are made available to the teaching staff. The audio-visual center should be close to the curriculum laboratory or teacher study center, if possible

D. A well-planned method of distributing materials to the schools

E. A program of material selection through teacher and curriculum specialists

F. A continuing in-service teacher training program including demonstrations and discussions of instructional materials

G. A budget adequate to purchase, replace, repair, and maintain audio-visual equipment and materials

H. A program to encourage the local production of inexpensive audio-visual materials such as slides, filmstrips, flat pictures, graphs, charts, models, and other instructional material

I. An evaluation program to determine the effectiveness of audio-visual materials in learning and teaching

The school's audio-visual program will be only as effective as it is made important by the school administrator. A good program must be planned to meet curriculum needs and be based on a long-range program. It will be of limited value if planned on a day-by-day basis.

1. Describe how you, as a teacher, could profit by a well organized audio-visual program in your school.

THE INSTRUCTIONAL MATERIALS CENTER IS AN IMPORTANT PART OF ANY MODERN SCHOOL PROGRAM.

Administrative Policy

The importance of the school administrator in the audio-visual program cannot be overstressed, for it is he who must convince the school board of the value of the program, to secure the necessary budget for its continuation, and provide time for the director, building coordinators, and teachers to make the service useful and effective. It is up to the administrator to provide professional leadership in the cooperative development of the purposes, objectives, and outcomes of the program. In other words, he should, in cooperation with his teachers, draw up a blueprint of the audio-visual program. Any type of an operation that does not have a blueprint to follow is doomed to ineffectiveness or failure.

Because of the relative newness of many types of audio-visual equipment and the recent rapidly increased availability of a wide variety of materials, many school audio-visual programs have just "growed like Topsy." Collections of materials have grown larger and projection equipment has been added, piece by piece, until it has been virtually impossible for teachers or administrators to locate or use audio-visual materials without confusion. Centralization seemed to be the answer. So-called "audio-visual programs" were established and coordinators were appointed. Many of these programs were established primarily as an administrative step to simplify the process of ordering, procuring, distributing, storing, and repairing equipment and materials. Although this was a notable accomplishment, usually little or no attention was directed toward the development of a program based on sound principles of education. Usually, only slight consideration was given to such problems as: How will the audio-visual program supplement the stated philosophy of the school? How will it complement the curriculum? What will be the role of the teacher in the program? What will be the basic functions of the program and how will these functions be implemented? What is the administration's attitude concerning the program? How will the use of audio-visual materials assist with the communication of ideas and the improvement of instruction? Thoughtful consideration of the objectives which the audio-visual program should need will usually insure the development of wise administrative policy.

2. Describe what you believe are the "guiding principles" that should direct the audio-visual program.

Trained Director

The success of any audio-visual program, whether in a large school system or in a small one-building system, will depend on the person directing it. Most large school systems have a full-time audio-visual director with a staff to assist in the selection, purchase, booking, and distribution of materials. In most small schools, a teacher is designated as audio-visual director or co-ordinator, perhaps on a part-time basis. Some one person must be responsible for the program if it is to serve the needs of all the teachers. The problems of locating, ordering, planning for evaluations, and distributing and returning of materials must be his responsibility.

The audio-visual director should be primarily a teacher and have a background of both elementary and secondary education. The director should have a wide experience in curriculum and psychology and a knowledge of instructional problems. He should have a knowledge of sources of materials, evaluation and utilization techniques, and methods of producing the less expensive, school-produced types of audio-visual materials. He should also have training in the types and methods of operation of all audio-visual equipment.

3. What additional qualifications do you believe the audio-visual director should have to best carry out his responsibilities?

In addition to the audio-visual director, who is responsible for the audio-visual program of the entire school system, most schools designate one person in each building to serve as audio-visual coordinator. The coordinator, in most instances, is a teacher who has an interest in the audio-visual program or has had course work in this field. The duties of the coordinator are to assist teachers within the building, to order materials, to suggest ways for improving the use of materials, to return materials to the audio-visual center, and, in general, to coordinate the individual school's program. This person works in close cooperation with the audio-visual director of the school system.

THE AUDIO-VISUAL DIRECTOR SHOWS A TEACHER A VARIETY OF TEACHING MATERIALS WHICH WILL HELP HER IN THE STUDY OF SWEDEN.

St. Louis Public Schools

The Audio-Visual Center

Regardless of the size of the school system, there must be a central location where teachers can go for assistance, materials and equipment. The larger the school system, the more space is needed for the functions that must be performed. Even in the small school, the centralization of materials and equipment will save valuable teaching time, cause less confusion and simplify administrative procedures.

The audio-visual center is the place where most instructional materials are housed and the place from which materials are distributed to the schools and classrooms. Such a center is much more than just a place to house instructional materials. It is often located close to the curriculum laboratory, where teachers can review or study curriculum matters and at the same time preview and inspect available instructional materials. Such centers usually have interesting displays of new materials, easy access to source indexes, and preview and prelistening rooms. The audio-visual center often has facilities for teachers to produce their own charts, graphs, handmade lantern slides, and other inexpensive instructional materials. In the larger centers, the audio-visual director and other staff members trained in curriculum problems at the different grade levels are available to assist teachers in the selection of materials and methods of using them. The audio-visual center is a service center to provide help to teachers so they can do a better job in the classroom.

The major functions of the audio-visual center are the following:

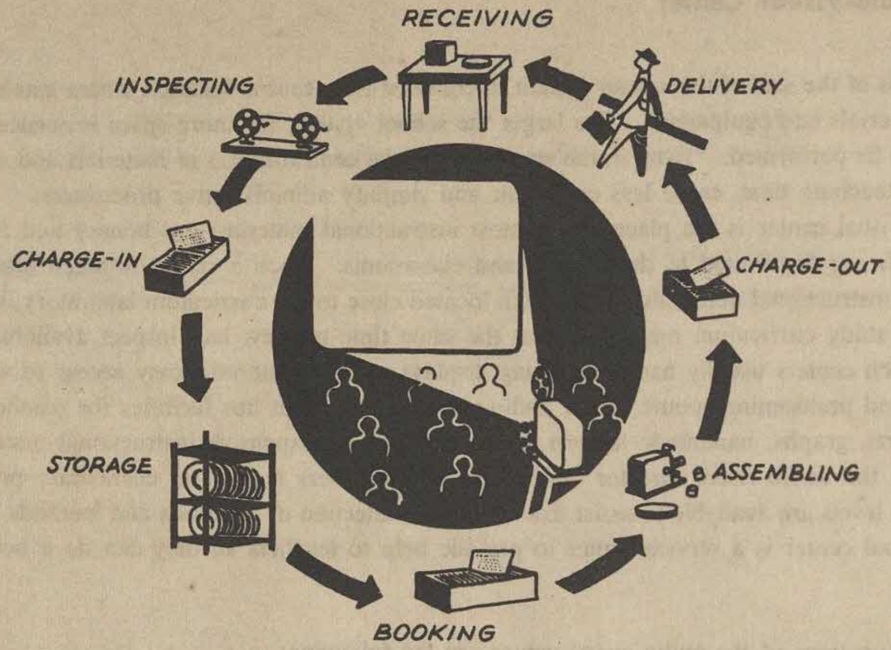
A. To assist subject matter specialists with the selection and evaluation of materials.
B. To purchase or produce materials recommended.
C. To catalog all materials and issue lists of available materials.
D. To purchase, repair, and maintain all equipment.
E. To distribute materials and equipment.
F. To inspect, repair, and maintain instructional materials.
G. To conduct in-service programs on the improved use of all materials.

The audio-visual center should always be a place that teachers will want to visit, and where they will receive suggestions and help with their instructional problems. It should not be just a place to store materials.

4. Describe several ways in which a central location for the audio-visual program in your school would assist you as a teacher.

Distribution System

The audio-visual service must be organized to supply equipment and materials at the time and place they are needed. Teachers must be confident that the materials they order will be delivered for use on the day and at the hour requested. Delays and disappointments generate ill will and hamper effective instruction.



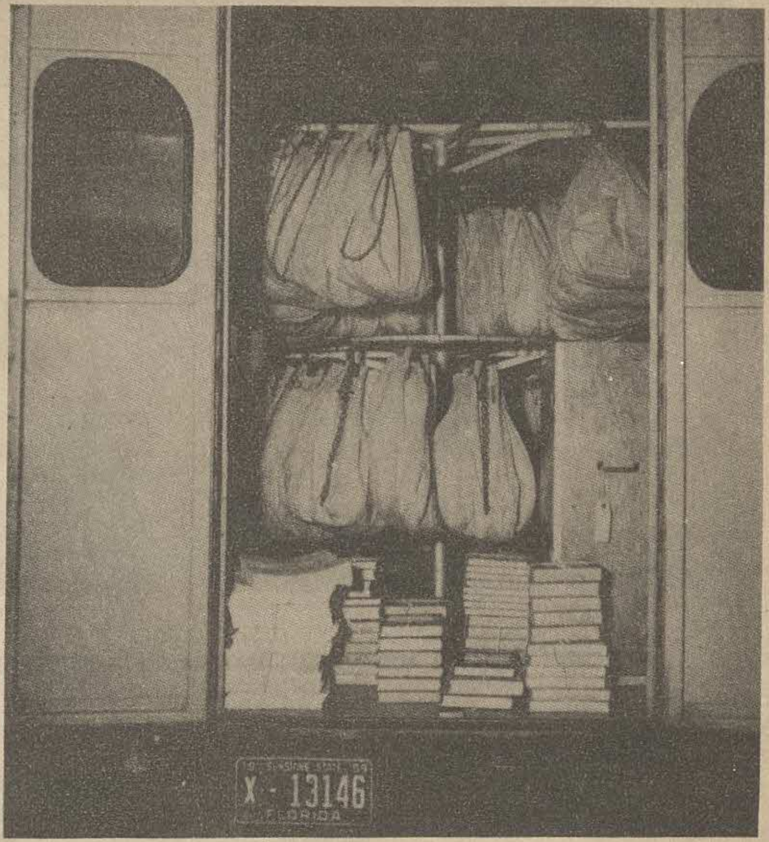
In providing such service, some type of organized system must be developed and followed. Although the audio-visual services in various schools and school systems will differ in terms of the forms and procedures used, the process which they all go through is approximately the same. The steps in the supply cycle of equipment and materials are as follows:

A. Booking: Materials requested must be reserved for the specific time desired.
B. Assembling: On the date of delivery or use, materials must be assembled and packed.
C. Charge Out: Materials to be delivered must be charged out to the requesting person so that an accurate account of them may be maintained.
D. Delivery. Pick-up and delivery service provides the means of getting the material and equipment to the place of use.
E. Receiving: After use, materials are returned to the audio-visual center.
F. Inspecting: Upon return, both equipment and materials must be inspected for damage. Continuous inspection and preventive maintenance will keep equipment and materials at the peak of operating efficiency.
G. Charge In: After inspection, the materials and equipment are charged in. This keeps records current.
H. Storage: Proper storage promotes longer life of both materials and equipment. It also provides easy maintenance, booking, and assembly.

In supplying precision service, the audio-visual center must have centralized control over all equipment and materials. However, this does *not* mean that all equipment and materials must be kept at the center. Equipment should be located, on a temporary loan basis, at the place of greatest use. Only a few pieces of equipment, called "floater" equipment, should be kept in the center to meet emergency situations or to fill requests from occasional users.

Films should be centrally located to provide adequate storage and maintenance; however, other types of materials may be decentralized in location to insure maximum use.

The size and extent of the audio-visual program will determine the method of providing projectionist service. Some schools have developed student operators clubs; others have trained their faculty members to operate the equipment. Whatever system is used, only qualified persons should be allowed to operate the equipment. This will insure lower maintenance cost and longer equipment life.



INTERIOR OF INSTRUCTIONAL MATERIALS DELIVERY TRUCK, DADE COUNTY, FLORIDA.

Dade County Schools, Florida

The use of projection equipment requires adequate classroom facilities. It should be the responsibility of the staff of the audio-visual center to make recommendations for adequate light control, ventilation, and screens to insure the most effective learning environment possible in all classrooms.

Selecting Materials for Classroom Use

Any wise audio-visual director or coordinator will make extensive use of faculty committees and individual teacher conferences to assist him in the selection of various types of equipment and materials to be procured for the school. Following such practices will result in the procurement of the most usable material and equipment and will further indicate to teachers that the program is truly designed to assist them with their instruction.

Obviously, the director or coordinator will have to temper some of the recommendations of the faculty for the sake of standardization of equipment, budgetary restrictions, repair facilities, and the like. However, faculty suggestions should be taken into consideration as much as possible.

While he is acting as the liaison between the faculty and the administration, it is the responsibility of the director or coordinator to *recommend* to the administration the purchase of needed equipment and materials, the development of new facilities, changes in procedures, and all other matters that will improve the learning environment or the teaching situation.

It is imperative that the audio-visual service assist the persons whom they serve *to help themselves.* The most effective program is that which belongs to the teachers. For this reason, the program must be personalized as much as possible.

Los Angeles Public Schools

TEACHERS BOOKING AUDIO-VISUAL MATERIALS FOR FUTURE USE.

Dade County Schools, Florida

DEMONSTRATING METHODS OF MOUNTING MATERIALS FOR CLASSROOM USE.

The conscientious audio-visual director should try to assist each individual asking for help with his or her own problem of communication. Often, teachers are unable to recognize the nature of their problem of communication, and, as a result, ask, "Do you have a film on ____________?" In many instances, a motion picture is not the answer. If the director can help the teacher determine the real problem and suggest a more appropriate medium that might be used, a real and lasting impression will be made concerning the true relationship between the use of audio-visual materials and effective instruction. The director should assist teachers from the point of problem determination through to the evaluation of the effectiveness of the presentation.

The steps involved in this procedure are:

A. Determination of the nature of the problem
B. Selection of the most appropriate media
C. Production or procurement of the material needed
D. Utilization of the material
E. Evaluation of the procedure's effectiveness, including the material, the methods of use, and the student reaction

5. What should be the role of the teachers in selecting materials for the audio-visual center of a school or school system?

In-service Training Programs

It is the function of the audio-visual center to educate and train the faculty members, students, and patrons who use the service in audio-visual techniques and procedures. Such education and training is mandatory to insure the efficient operation of equipment and the effective utilization of materials.

Education implies that teachers, students, and patrons have a thorough working knowledge of the steps involved in the selection, utilization, and evaluation of audio-visual materials.

Training implies that teachers, students, and patrons are capable of setting up, cleaning, operating, making minor repairs, and repacking all the various kinds of equipment available for their use.

Such education and training is a *process,* not an event, and can be done in both a formal and an informal way. Workshops, conferences, short courses, and demonstrations that meet for specific periods of time would be considered formal programs. Personal interviews and individual refresher training sessions would be considered a part of an informal program. The type and amount of education and training sessions that are developed and used should be determined by the particular need in the specific school or school system concerned.

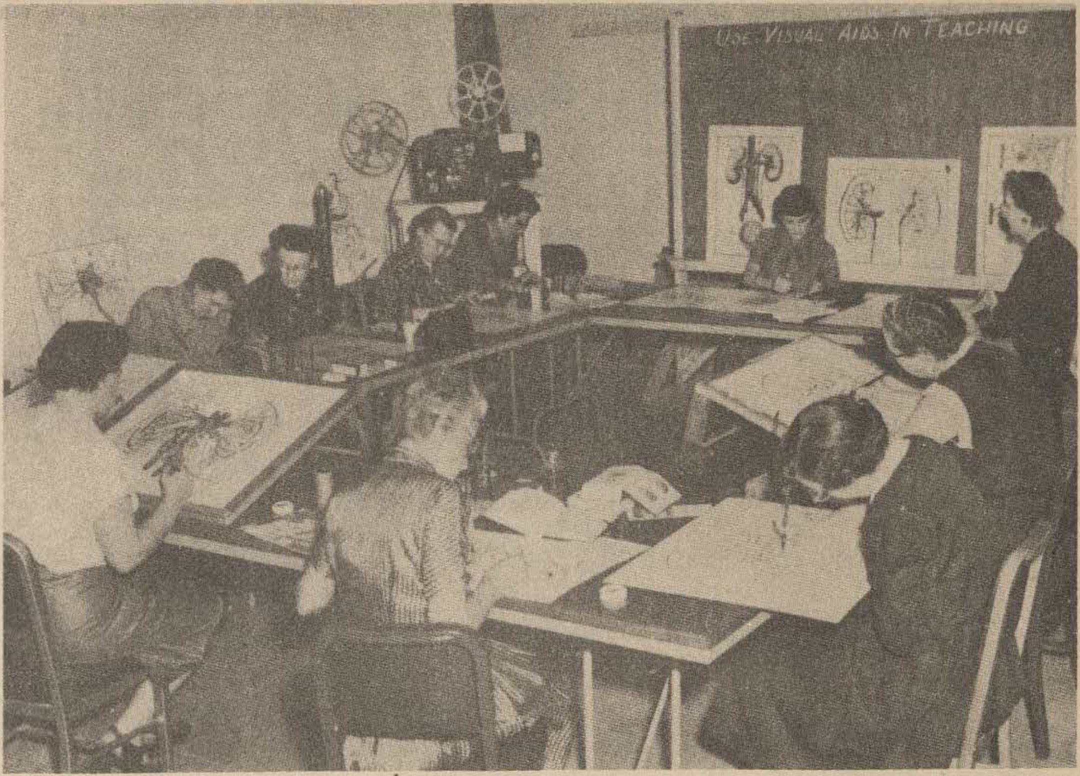
6. If you were asked to develop an in-service audio-visual program, what types of training program would you suggest? Outline briefly the type of program you would recommend, the time allotment, and what information you believe should be covered in each.

Producing Materials for the School

Although many of the important instructional materials will be produced within the individual school, the program for such production should be a part of the audio-visual instructional materials center.

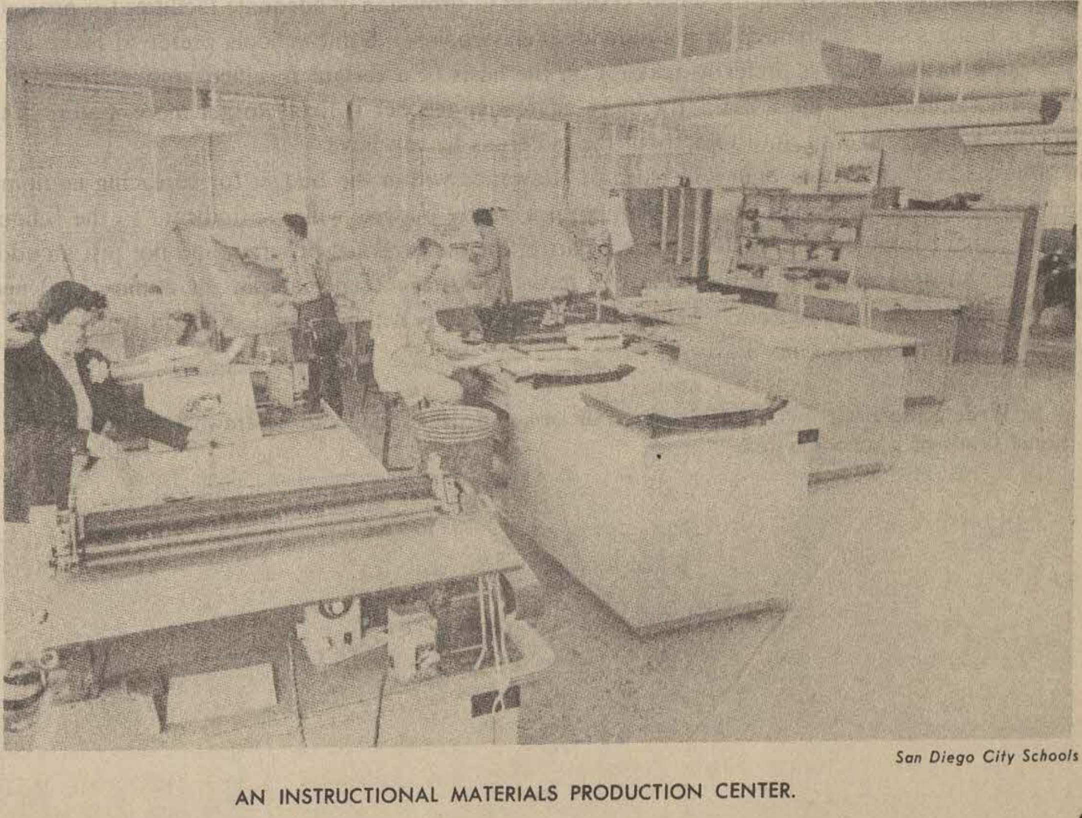
Handmade lantern slides, charts, diagrams, graphs, posters, flannel boards, exhibits, pictures, transparencies, models, and recordings are but a few of the types of materials which can be produced in the schools. We often hear teachers say, "We can't use audio-visual materials because we don't have a projector," when they should be thinking in terms of, "How can I inspire my students to want to visualize this unit," or "How can I make something to help them better understand the written materials?"

The commercially produced audio-visual materials are, in most cases, well-planned and carefully produced. Often, however, a teacher may wish to have something for use immediately to meet a specific instructional problem. In this case, the locally produced material will supplement the program and meet the teacher's specific objectives. In other instances, students may wish to produce charts, graphs, or handmade slides to vitalize a report or project. A well-planned program for producing audio-visual materials at the local level should be encouraged in every school.


USE VISUAL AIDS IN TEACHING

University of Texas

TEACHERS LEARNING HOW TO PRODUCE OWN VISUALS.



San Diego City Schools

AN INSTRUCTIONAL MATERIALS PRODUCTION CENTER.

7. List three different types of audio-visual materials you would like to produce, and give reasons for your choice.

a.

b.

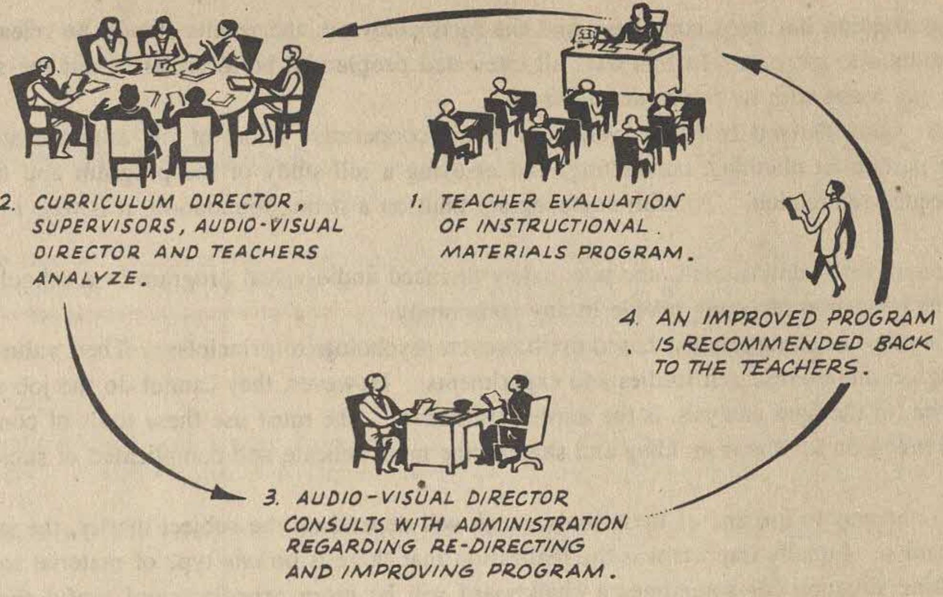
c.

Budget

It is impossible to say what the audio-visual budget should be for any specific school system. The budget should be adequate for the following: A. purchase of the necessary equipment; B. purchase and/or rent of materials, depending on the size of the school system; and C. provision of adequate facilities for projection pictures or for using sound equipment in the individual classrooms. Some schools prefer to make the budget on a per pupil basis. Others prefer to make it on the basis of a certain specified amount for each teacher or classroom. On the per pupil basis, the more aggressive teacher is likely to get more materials than the teacher who is willing to wait until told about the materials he can have.

The long-range audio-visual plan will have an allowance within the budget for replacing equipment and materials on a systematic basis. Such a plan, with a yearly budget, will also indicate to the school board that audio-visual equipment and materials are a part of the instructional program and not just an added frill. School administrators should plan the budget in terms of instructional materials or audio-visual needs and not develop just a "movie" program. School boards are usually willing to budget for instruction but hesitate to authorize such things as "movies."

8. Write a short statement in the defense of an audio-visual budget to be drawn from the general instructional funds of a school system.


1. TEACHER EVALUATION OF INSTRUCTIONAL MATERIALS PROGRAM.
2. CURRICULUM DIRECTOR, SUPERVISORS, AUDIO-VISUAL DIRECTOR AND TEACHERS ANALYZE.
3. AUDIO-VISUAL DIRECTOR CONSULTS WITH ADMINISTRATION REGARDING RE-DIRECTING AND IMPROVING PROGRAM.
4. AN IMPROVED PROGRAM IS RECOMMENDED BACK TO THE TEACHERS.

EVALUATION, ANALYSIS, AND RE-DIRECTION OF THE PROGRAM ARE NECESSARY.

Evaluating the Program

An audio-visual program will grow and develop like most other phases of school activities. To determine its effectiveness, such a program must constantly and continuously be evaluated. The technical term, evaluation, is a relative newcomer in educational parlance, but the procedure involved has been followed for generations.

Evaluation of school activities involves the identification and formulation of major objectives, their definition in terms of student behavior, and the construction of reliable, valid, and practical instruments for appraising the specific phases of such behavior and its changes.

Evaluation and curriculum planning go hand in hand because comprehensive evaluation provides evidence of the degree to which basic curriculum purposes are being realized. This evidence may lead to new curricular purposes and policies that may, in turn, provide new or changed objectives to be evaluated by new methods or techniques.

Such an evaluation should not be developed and conducted by the audio-visual director alone, but should be a process involving the cooperation of administrators, teachers, students, and patrons.

9. What should be the audio-visual director's role in evaluating the audio-visual program of the school?

When the evaluation has been completed and the facts analyzed, the results should be released and explained to faculty and patrons. In this way, all interested people will be informed about the status of the program and can assist with its future development.

The greatest value derived from an evaluation is the cooperative effort of the administrator, director, teachers, and parents in planning, conducting, and assaying a self-study of the program and finally determining any needed redirection. As with any program built on a strong foundation, it is wise *to make haste slowly.*

A well-directed, well-administered, and adequately financed audio-visual program in a school system is a vital link in the education of young people in any community.

The use of audio-visual materials is based upon proven psychological principles. Their values have been verified through countless research studies and experiments. However, they cannot do the job alone. It is the teacher who, in the final analysis, is the master craftsman. She must use these tools of communication with skill and precision for she is molding and shaping the most delicate and complicated of substances—the human mind.

There is no *one* way to use any of these tools; much will depend on the subject matter, the students, and the desired results. Equally important is the realization that there is no *one* type of material to meet every teaching-learning situation for sometimes a chalkboard will be more expedient and useful than a motion picture.

It is the teacher's prerogative to select from the vast array of audio-visual materials and methods those which she believes will be of greatest assistance to her in communicating ideas.

Armed with audio-visual techniques, the teachers of America are far better equipped to carry out the Herculean task of educating youth for tomorrow's world.

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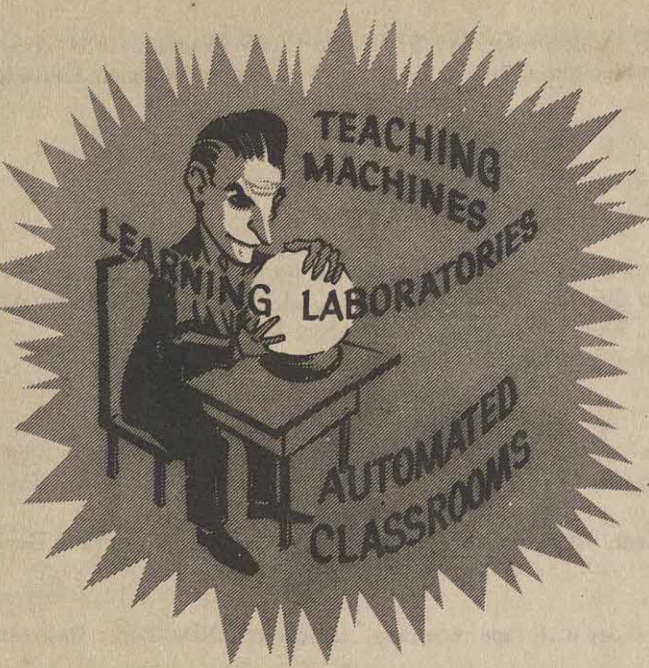

LOOKING FORWARD

27

SINCE THE BEGINNING of time man has sought new and better ways of doing things which will provide him and his family with more of the good things of life in less time and with less physical labor. He has created machines and devices and has applied them to almost every aspect of his life.

While technology and automation have been generally embraced by the American people in government, industry, and business, little attention has been given to their application to education until recently.

According to many educators, we are on the threshold of a new era in education which some have labeled the "Communication Revolution." It is predicted that this era will see the broad application and use of technology in the instructional process. No revolution, however, has ever taken place without creating basic problems.

In today's world the pressures of international crisis and the intense desire for technological world superiority have added more fuel to the fire. Educators themselves have differing points of view concerning the use of technology in education. This has created even more problems which, as Finn states, have been brought about because: "(1) those concerned professionally with education have not developed a well-conceived point of view and position concerning technology and education, (2) because of this lack of point of view and because of certain cultural lag factors naturally associated with education, the acceleration of technological development has tended to by-pass the entire educational enterprise until very recently, (3) professsionals in education are not prepared to deal with the tremendous impact that technology is beginning to have on the instructional process itself as, by the technological process of extension, technology begins to invade education in full force and, (4) the absence of understanding and a point of view among the profession creates a situation where the Neo-Technocrats not only can, but are beginning to move into the field of instruction." [1]

1. What do you believe should be the role of technology in education?

Research and Action

During the past few years, millions of dollars have been expended for equipment, materials, and research to find new methods and techniques by which more efficient use can be made of teachers' time, skill and ability. Financial support was first given for these projects by large foundations. Shortly thereafter, the Federal Government allocated funds for a variety of projects under the National Defense Education Act. It is obvious that with the continuing teacher shortage, the increasing birth rate and the desire to maintain quality education, vast sums will be spent in determining ways by which technology and automation can be applied to education.

At this writing it is impossible to determine the direction in which educational experimentation will go. However, there are three areas which are receiving considerable attention. These are: (1) Teacher Utilization, (2) Flexible Facilities, and (3) Teaching Devices.

Teacher Utilization

In the eyes of many Americans, a teacher is a person in a classroom who directs the learning activities of twenty to thirty students. In addition, she is a disciplinarian, a mother, an accountant, a book-keeper, a nurse, a janitor, and many others. Too often her primary responsibility, that of a teacher, becomes a secondary responsibility.

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[1] Finn, James D., *Technology and the Instructional Process,* Audio-Visuals Communications Review, Volume 8, Number 1, Washington, D. C., Department of Audio-Visual Instruction, Winter issue, 1960, p. 8.

Serious consideration is now being given to the problem of how to make the most effective use of the teaching talents of our classroom teachers, particularly when there is such a tremendous teacher shortage. The United States Office of Education estimated that in the year 1960, there was a shortage of 195,000 teachers in the nation's schools.

In many elementary schools a teacher is required to teach reading, writing, arithmetic, spelling, music, a foreign language, art, science, and history. The "single teacher" concept is also being scrutinized to determine ways by which a teacher, proficient in one subject matter area, can be utilized to teach that particular subject to a large number of students.

Experiments are being conducted to determine ways by which creative teaching can be fostered and quality education maintained. Some of the most promising methods being employed include the "team teaching" concept. Members of the teaching team include:

(A) Senior Teacher
This is a person who devotes her time and effort to preparing and presenting lessons, coordinates the learning activities of students, and acts as the captain of the team.

(B) Teaching Assistants
These persons may be less experienced teachers or intern teachers working toward their academic degrees. They are responsible for working under the direction of the senior teacher in performing many of the routine teaching tasks, such as conducting drills and assisting individual students with their assignments or problems.

(C) Nonprofessional Assistants
They are responsible for jobs which do not require teaching skill, such as typing, mimeographing, bookkeeping and similar tasks.

(D) Technicians
These persons include a group who serve in a support capacity to all teachers. They are graphic artists who can produce a wide variety of instructional materials, such as slides, motion pictures, cell overlays, drawings, etc.; television producers and directors who assist the senior teacher to utilize the unique characteristics of the medium in presenting closed or open-circuit broadcasting; and other types of technicians.

(E) Curriculum Specialists
These persons also assist all teachers and are responsible for the coordination of all the learning activities of the students.

Various innovations are currently being attempted. All of them are designed to make greater use of the teaching talents of the professional educator.

2. Describe how a school could make the most efficient use of your teaching talents.

Flexible Facilities

Another concept of the typical American school which is being scrutinized is the concept that all learning and teaching should be done in one 25 x 30 room surrounded by four walls and equipped with only a chalkboard. There has been a fetish among parents and educators to maintain small classes. Recent research indicates that there is little relationship between the size of the class and the achievement of students. Some types of learning activity, such as lecture demonstrations, can effectively be given to large groups of students. Other types of learning activities, such as discussions and student planning sessions, necessitate small group meetings. Still others, such as research, writing, recording, etc., demand that students work on an individual basis. All of these factors are forcing school administrators, parents, school boards, and architects to re-evaluate school building construction, school facilities, and scheduling of classes.

Schools of the future may have a variety of different size rooms, specifically designed. There is no magic number such as 25 students per class for optimum learning. There is no magic number such as 45 minutes or 50 minutes per class hour. Some types of learning activities, such as laboratory assignments or a lecture may take 90 minutes to complete, whereas others, such as language drill or student planning sessions, may be accomplished in 30 minutes.

The scheduling of various types of learning activities in different time blocks presents real problems to school administrators; however, these problems must be solved if we are to provide quality education to the youth of America.

3. If you could have any type of classroom arrangement you wanted, describe the type of flexible facilities you would like to have for teaching your particular subject.

   A. Grade

   B. Subject Area

   C. Facilities

4. Within the school day

   A. How much time would be necessary to teach your subject?

   B. How would you divide this time? (i.e., Lecture, Demonstration, Individual Student Work, etc.)

Teaching Devices

Among the new technological developments which are making their appearances in education are the learning laboratories, teaching machines, open- and closed-circuit television, automated classrooms, and a host of others. Each have their advantages and limitations. It is the wise teacher who keeps abreast of all these new developments and selects those which are economically feasible, educationally sound, and will free her from the routine tasks which provide more time for creative teaching.

Learning Laboratories

Laboratories have been used for generations in the teaching of science. Only recently has the laboratory concept been applied to such areas as foreign languages, mathematics, speech, and others.

Laboratories of the future will include a wide range of projection and audio equipment for individual study. These laboratories will become resource centers to complement lectures, discussion group meetings, readings, and research.

Teaching Machines

Teaching machines were introduced to education in the late 1920's by Sidney L. Pressey. They are basically a tutoring device. There are many forms of teaching machines ranging from the simple cardboard mask to the very complex electronic computers.

Teaching machines have certain specific characteristics which make them applicable to certain phases of the learning process. Many machines:

A. Provide for immediate student knowledge of correctness of his response.
B. Offer opportunity for the student to "try again" until a correct response is obtained.
C. Prevent students, in most cases, from progressing until the correct response is made.
D. Provide the correct response before moving on to the next question or problem based upon the student's last impression.
E. Indicate the number of incorrect responses preceding the correct response.
F. Enable the student to proceed at his own pace, however slow or fast this may be.

While every teaching machine may not have all of these characteristics built into it, they all have some of these characteristics in common.

Teaching machines range in cost from less than a dollar to several thousand dollars. They range in size from a punchboard unit that fits in a person's hand to the large computers occupying an area of several cubic feet. They vary in complexity from a cardboard folder with a small cut out window to combination microfilm, motion picture projection devices with punched cards and tapes.

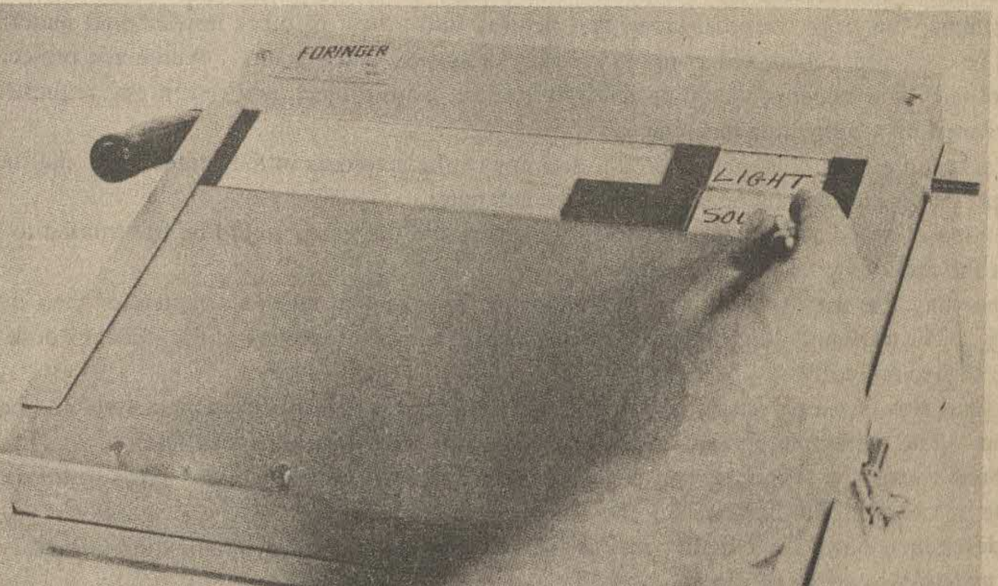
There is concern in some quarters that the teaching machine may replace the teacher; however, Edward Fry states that "Technological advances (teaching machines) in education will no more replace the teacher than washing machines have replaced the housewife. They will emancipate her for work that no machine can perform." [1]

---

[1] Fry, Edward, "Teaching Machines: The Coming Automation," Phi Delta Kappan, 1959, 16–28–31.

Teaching Machines, Inc., Albuquerque, New Mexico

A TEACHING MACHINE IN USE



Foringer & Co., Inc., Rockville, Maryland

SMALL COMPACT MACHINES OF THIS TYPE CAN BE USED AT ALL GRADE LEVELS

5. Describe a specific type of teaching machine and tell how you could use it for individualized instruction in your subject matter area.

Automated Classrooms

Several electronic companies have, on their drawing boards, sketches of new types of equipment which can be used for instructional purposes. Some include the use of a built-in projector on the teachers desk on which the teacher may place any object. This image will be sent to individual viewers built into the students' desks for student analysis and study.

Another plan which is currently feasible is the electronic instructional material center. In this center will be stored films, film strips, records, tapes, flat pictures, and a host of other instructional materials. They would all be cataloged, coded, and stored in specially designed compartments. Automatic projectors, placed in front of television cameras, would be ready to receive, load, project, and return any requested materials when activated by a computing machine.

The teacher in a classroom who desired to use any of the materials in the center could dial her requests, on a telephone-type instrument on her desk, to the computer.

The computer would activate the automatic projectors and the image would be transmitted to a television screen in the requesting teacher's classroom.

Students may also use the facilities of the electronic instructional materials center for their own research and study. The transmitted signal would activate a small television receiver in the student's desk rather than the large classroom receiver.

Each year, new developments provide more and better types of instructional materials and equipment to education. The thermoplastic tape may make kinescope and video tape obsolete.

The 8mm., magnetic sound, motion picture projector may make instructional films so inexpensive as to allow the purchase of film libraries for any school regardless of size.

The development of "Cold Light" may make possible the increased illumination necessary to project opaque materials in a lighted room.

These are but a few of the developments which are practical and possible. The classroom teacher of tomorrow will have at her command, a vast source of materials and a variety of electronic devices to assist her.

However, it should never be forgotten that teaching is a creative business. None of these materials or devices can or will replace the teacher because creativity is a function of the human mind.

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